TEL MOOC Long Term Impact Evaluation Study

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Dr Leigh-Anne Perryman

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The Commonwealth of Learning (COL) is an intergovernmental organisation created by Commonwealth Heads of Government to promote the development and sharing of open learning and distance education knowledge, resources and technologies.

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Executive Summary

TEL MOOC – an openly licensed massive open online course (MOOC), collaboratively developed by the Commonwealth of Learning and Athabasca University, is intended to 'provide an accessible learning opportunity to teachers, particularly in developing countries, to expand upon their knowledge and skills regarding the use of technology in teaching and learning' (Cleveland-Innes et al, 2017, p. 1). TEL MOOC has been presented four times to date. The first three presentations have been evaluated in respect of the course design and content, the facilitation and learners' experience of studying the course. The evaluation documented in this report ranges more widely to examine TEL MOOC's short-term, medium-term and long-term impact on participants and other stakeholders, focusing on the following questions:

- What is TEL MOOC's impact on participants' attitudes and behaviour, especially their subsequent use of technology-enabled learning (TEL), open educational resources (OER) and open educational practices (OEP)?
- How does this impact vary across diverse contexts?
- What factors have contributed to and/or limited this impact, and how do they differ across diverse contexts?
- What is TEL MOOC's impact on stakeholders other than the participants themselves, for example on those participants' colleagues and peers, on learners taught by those participants, on institution leaders, and on society more generally?

A mixed methods strategy was adopted for the evaluation, comprising an online survey completed by 214 TEL MOOC participants and qualitative interviews with five case study participants. A theory of change approach was adopted as the basis for the evaluation due to its affordances in offering a systematic framework for investigating the complex relationship between cause and effect that must be unraveled when conducting a long-term impact study, and for investigating the mechanisms of change in very diverse contexts.

The TEL MOOC theory of change, and the evaluation itself, is structured around four Impact Pathways. Impact Pathway 1 proposes that TEL MOOC participants develop their practice as educators as a direct result of studying the course, leading to improved outcomes for learners. The evaluation offers extensive evidence that TEL MOOC has resulted in attitude and behaviour changes for participants in a variety of roles – including educators, managers and researchers – across many different education sectors, levels and formats, and in an equally diverse range of geographical settings. Participants report increased positivity about the value of TEL and of OER, increased confidence in implementing new technologies and pedagogies and in adopting open educational practices, increased willingness to experiment with new teaching and learning methods, and increased reflective practice as education professionals. TEL MOOC participants also report a positive impact on their learners' study outcomes, including improved grades and engagement, increased attendance at school/college and increased retention. However, in many settings that impact can be limited by factors such as lack of resources, poor infrastructure, workload pressures, cultural restrictions and unsupportive managers and colleagues. An important finding is the extent to which individual educators are taking matters into their own hands in the attempt to remove these barriers, for example by purchasing equipment and internet data bundles themselves.

Impact Pathway 2 proposes that TEL MOOC participants share knowledge, skills and resources with colleagues, leading to colleagues' practice changes and subsequent longer-term impact on learners and society. TEL MOOC participants did indeed report increased collaboration with colleagues in their own institutions, and beyond, as a consequence of studying the course, with a subsequent multiplier effect whereby knowledge, skills and resources shared with those colleagues lead to their experimentation with TEL and OEP. Again, however, challenges such as unsupportive management, infrastructure weaknesses and a lack of resources are shown to greatly limit impact in some circumstances.

Impact Pathway 3 proposes that TEL MOOC participants may influence institution leaders, leading to institution-wide policy/strategy change, and subsequent long-term impact on learners and society. Again, the evaluation offers evidence in support of this hypothesis, with participants confindent in the value of TEL and OER being able to demonstrate to their managers and institution leaders the benefits for learners (and the institution) of implementing TEL and of using OEP, resulting in support for such innovation including the investment of money and human resource.

Impact Pathway 4 proposes that TEL MOOC participants' learning and professional practice will be enhanced by their being part of a massive cohort of MOOC learners and by developing networking and collaboration skills that can lead to ongoing knowledge-sharing and peer support long after they have completed the course. The value of TEL MOOC as a network in itself is clear from the evaluation findings. Participants have welcomed the opportunity for knowledge-sharing within that network, the opportunity to learn networking skills from their peers and from the course facilitators, and the chance to practice those skills by being part of a massive online cohort of learners. Participants' subsequent use of online networks to further develop their practice and openly share resources demonstrates the potential of TEL MOOC to achieve impact, including capacity building, on a global scale. TEL MOOC's open license is important here, allowing the course and its resources to be freely shared. However, the case study testimonies, in particular, give an indication that cultural constraints, gender-related inequalities, and language barriers can limit opportunities for networking in this way.

Short summary

A theory of change-based evaluation of the Commonwealth of Learning/Athabasca University-created TEL MOOC finds extensive short-, mid- and long-term impact on TEL implementation and open educational practices across 32 countries, leading to improved learner outcomes and institutional change. However, infrastructure problems and institution-related, technological and cultural barriers limit impact in many contexts.

Suggested Tweets

New evaluation finds @COL4D's TEL MOOC has big impact on TEL implementation, #OER use, #OEP, learner outcomes & institutional change across 32 countries. But, impact limited by infrastructure, technological, cultural & institutional barriers: (202 chars + link)

New Theory of Change-based #MOOC evaluation framework developed for study of @COL4D's TEL MOOC, allowing context-specific investigation of impact in diverse settings. See framework & read evaluation findings: (168 chars + link)

Evaluation of @COL4D's TEL MOOC finds 4 impact pathways whereby participants: (1) Implement TEL, improving learners' outcomes; (2) Influence colleagues re TEL/OER use; (3) Influence institution leaders; (4) Develop practice thru increased networking: (210 chars + link)

1. Introduction

Since the launch of the first massive open online course (MOOC) in 2008, numerous claims have been made about their power to fix broken education systems and disrupt traditional education. Educational technology commentator Audrey Watters (2017) recalls that, especially in the Global North, many ascribed to MOOCs the power of "a magical meritocracy" that could "make education borderless, gender-blind, race-blind, class-blind and bank account-blind" (para 8). The media frenzy and eulogising around the power and potential of MOOCs has greatly calmed in the Global North (Kovanovic et al., 2015). However, MOOCS are still being positioned as potential solutions to increasing access to quality education in the Global South (Laurillard and Kennedy, 2017), often in connection with Sustainable Development Goal (SDG) 4 - "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all".

However, some argue that MOOCs strengthen the dominant academic culture of the West, to the exclusion of alternative voices, "exacerbating existing educational divisions and deepening the homogeneity of global knowledge systems" (Czerniewicz et al., 2014, p. 122). Subsequently there has been a growing call for the creation of more localised MOOCs in the Global South, with increased relevance to learners in respect of both pedagogy and content. There has also been demand for rigorous evaluation of MOOCs' long term impact on learners and other stakeholders in diverse contexts, in order to ascertain whether individual courses are achieving their intended outcomes, especially those related to helping achieve the SDG.

This report details the findings of a long-term impact evaluation of the 'Introduction to Technology-Enabled Learning (TEL) MOOC'[1] - a collaboration between Athabasca University, Canada, and the Commonwealth of Learning. The report also outlines a new approach to investigating MOOCs' long-term impact.

1.1 About TEL MOOC

TEL MOOC is delivered on the mooKIT platform, is openly licensed, and intended to "provide an accessible learning opportunity to teachers, particularly in developing countries, to expand upon their knowledge and skills regarding the use of technology in teaching and learning" (Cleveland-Innes et al, 2017, p. 1). TEL MOOC is studied over five weeks and, to date, has been delivered three times, with a fourth presentation commencing at time of writing (September 2019). A total of 7967 people registered for the first three TEL MOOC presentations. Further details about TEL MOOC learner demographics and characteristics can be found in the evaluation reports for those presentations (Cleveland-Innes et al. 2019; Cleveland-Innes et al., 2018; Cleveland-Innes et al., 2017).

TEL MOOC course content is delivered through a combination of video and text-based media, with direct instruction provided by two content experts from Athabasca University, Dr. Martha Cleveland-Innes and Dr. Nathaniel Ostashewski, supported by a number of teaching assistants to facilitate course discussion. The course content is also available as OER[2]. Instructional design for TEL MOOC is based on The Community of Inquiry (CoI) theoretical framework (Garrison et al., 2000), which was also included in the course content for Week 1. In the first TEL MOOC evaluation report (Cleveland-Innes et al., 2017), the authors explain that "in keeping with the three presences of the CoI model (social presence, cognitive presence, and teaching presence), the MOOC design offered opportunities for self-reflection, active cognitive processing, interaction, and peer-teaching" (p. 10).

A key component of TEL MOOC is learners' creation of TEL Activity Plans in which they apply to

[1] https://www.telmooc.org/
[2] http://oasis.col.org/handle/11599/2765

their own settings the knowledge gained through studying the course. Cleveland-Innes et al. (2017) explain that "participants were provided with a template outlining the key components of an activity plan involving technology-enabled learning, which they could adapt to a learning objective or topic specific to their own teaching environment" (p. 14). The TEL Activity plans are the final assignment for the course and are required for a Certificate of Completion. Learners may, optionally, openly share their TEL Activity Plan by posting it to the TEL Resources repository[3] as an OER. A full description of the TEL MOOC pedagogy and content, including the use of Activity plans is given in the three evaluation reports.

1.2 The TEL MOOC impact evaluation and report structure

The TEL MOOC impact evaluation focuses on the following questions:

- What is TEL MOOC's impact on participants' attitudes and behaviour, especially their subsequent use of technology-enabled learning (TEL), open educational resources (OER) and open educational practices (OEP)?
- How does this impact vary across diverse contexts?
- What factors have contributed to and/or limited this impact, and how do they differ across diverse contexts?
- What is TEL MOOC's impact on stakeholders other than the participants themselves, for example on those participants' colleagues and peers, on learners taught by those participants, on institution leaders, and on society more generally?

The TEL MOOC evaluation draws and builds on the findings of the three previous TEL MOOC evaluation studies (Cleveland-Innes et al. 2019; Cleveland-Innes et al., 2018; Cleveland-Innes et al., 2017), each focusing on learners' experiences and outcomes during their study of the course, and on existing MOOC evaluations. Section 2 of this report gives a review of some of the MOOC evaluations informing the TEL MOOC study, and related literature covering MOOC impact and the implementation of TEL.

In investigating the long-term impact of a course on education practitioners, the TEL MOOC study is amongst a small minority of MOOC evaluations. In investigating the impact of a MOOC on stakeholders beyond the participants themselves the TEL MOOC evaluation is amongst an even even smaller group of studies. One reason for this may be the difficulties involved in measuring this type of impact, which requires navigating the complex relationships between cause and effect – a key requirement for the TEL MOOC evaluation strategy outlined in this report. Section 3 of this report discusses that strategy, outlining and explaining the 'theory of change' approach that has been used as the framework for the TEL MOOC impact evaluation.

A mixed methods approach has been adopted for the TEL MOOC evaluation, comprising an online survey followed by qualitative interviews with selected TEL MOOC participants. Section 4 of this report outlines the study methodology and methods. The study findings are detailed in Sections 5, 6 and 7, while Section 8 discusses their significance and makes recommendations to the Commonwealth of Learning and to the open education community more generally.

2. Literature review

This literature review covers two main areas:

- Existing studies evaluating the impact of massive open online courses (MOOCs), especially those covering MOOCs' long-term impact on professional practice.
- Literature presenting MOOC evaluation frameworks and methods, especially those taking contextual factors into consideration and/or covering long term impact.

[3] http://www.telresources.org

2.1 MOOC evaluation to date

The TEL MOOC evaluation approach is informed by existing MOOC evaluation-related literature. The impact of teaching and learning activities, in common with any intervention intended to effect change, can be evaluated at multiple points and in multiple ways. E-learning has been extensively evaluated (for an overview see Means et al's (2010) comprehensive meta-review). While some characteristics of MOOCs overlap with the more general category of e-learning (e.g. being online), MOOCs also exhibit distinct characteristics, for example large diverse cohorts, the open nature of the courses, the relationship between facilitator and learner, and the impact of participating in a massive network of peers. As such MOOCs demand an evaluation approach that is appropriate to those characteristics.

The efficacy of MOOCs has been investigated ever since the first course was given that label - Connectivism and Connective Knowledge (CCK08), created by educators Stephen Downes and George Siemens in 2008. However, since then such evaluations have tended to concentrate on what can be easily measured at scale, for example learner demographics, retention and completion rates (Liyanagunawardena et al., 2013) and on learners' experiences during their study of a course, rather than investigating longer-term impact after the course has ended. For example, there is no shortage of evaluations focusing on MOOC quality and covering such topics as the effectiveness of structure, content and pedagogy in terms of participants' learning experience and their achievement of course learning outcomes. Examples include Gamage et al. (2016), Creelman et al. (2014) and Margaryan et al. (2015). Other notable empirical studies related to the learner perspective in MOOCs have covered topics such as the background of students and their behaviour related to performance (DeBoer et al., 2013), intentions of MOOC learners (Reich, 2014; Campbell et al., 2014) and learning paths across several MOOCs (Perna et al., 2014). Veletsianos and Sheperdson (2016) give a useful overview of the range and types of empirical MOOC studies produced between 2013 and 2015.

2.1.1 Evaluations focusing on MOOCs' impact on professional practice

A further category of MOOC evaluations focuses on courses' function as professional development, especially amongst educators. Such studies are particularly relevant for the evaluation of TEL MOOC's long term impact on participants' practice as educators/other education practitioners and on participants' educator and managerial colleagues.

Interestingly, many of the MOOC evaluation studies focusing on professional development are related to medical and health education, perhaps due to the typically bounded nature of disciplinary communities and the likelihood of researchers in specific disciplines being more influenced by peers within that discipline than by researchers from other subject areas. Examples relevant to the TEL MOOC study include Pickering and Swinnerton's (2018) evaluation of healthcare professionals' experiences studying of an anatomy MOOC, discussed in Section 4 of this report in respect of its focus on investigating individual MOOC learners' experiences; Patel et al.'s (2019) evaluation of the long term impact of the *Eliminating Trachoma* MOOC developed by London School of Hygiene and Tropical Medicine staff and 37 collaborators from 12 countries, discussed later in Section 2 in respect of its adaptation of a 'Value Creation Framework' approach; and Milligan and Littlejohn's (2014) evaluation of the impact on professional practice of the edX MOOC *Fundamentals of Clinical Trials.*

Milligan and Littlejohn's evaluation focuses on the short term impact of the featured MOOC, with interviews conducted while the course was running. Of note, the evaluation identified a gap between "learning intentions and learning behaviour", finding "little evidence of professional learners routinely relating the course content to their role, and little impact of the course on practice". The authors explain that "while the learners are motivated to participate by specific role challenges, their learning effort is ultimately focused on completing course tasks and assignments" (p. 197). The TEL MOOC evaluation builds on this finding in investigating whether, in the longer term, any intention-behaviour gap might decrease as MOOC learners have the time and opportunity to reflect on the significance

for their practice of knowledge gained and skills developed, and to experiment with new ways of working and new approaches.

2.1.2 The use of MOOCs for teachers' professional development

In 2013, Lawrie and Burns wrote that "teacher professional development is in crisis – particularly in the world's poorest and most fragile countries" (para 3). Misra (2018), in his comprehensive overview of the use of MOOCs for teacher education, proposes that MOOCs are "a cost effective, easily accessible and effective tool for professional development of teachers" (p. 69), echoing Palmer's (2015) assertion that "Teacher Professional Development is perhaps the most natural service MOOC providers could immediately provide teachers" (para 7). However, Castaño-Muñoz et al. (2018), echoing the points made four years earlier by Jobe et al. (2014), observe that despite the potential of MOOCs as a form of teacher training,

> There is surprisingly little research that systematically analyses the characteristics of teachers participating in MOOCs specifically from the perspective of their professional development. Only a few studies are available to date and most of the available literature reports about the design and effects of a single MOOC for teachers. (p. 608)

Studies that do cover the use of MOOCs as professional development for teachers include Kleiman, Wolf and Frye's (2013) report of the value of MOOCs as training for teachers where resources are scarce, Vivian et al's (2014) account of the design and implementation of a MOOC aimed at supporting Australian teachers with the implementation of a new computing curriculum and Laurillard's (2014) report of a low-cost teacher development MOOC.

Of particular relevance to the TEL MOOC evaluation is Laurillard's (2016) explorative study about a professional development MOOC intended for teachers from emerging economies. Laurillard reports that while the overall reach of the MOOC was good, teachers from emerging economies were underrepresented amongst those participants who completed the MOOC and completion rates were higher when the job status of the participants was also higher. Similarly relevant, especially in its focus on teachers' ICT skills, is Castaño-Muñoz et al.'s (2018) report on a MOOC initiative supported by the Spanish Ministry of Education, intended to offer teachers professional development on the use of ICT for teaching and learning. The study is limited, however, in its focus on Spanish participants in MOOCs. In addition, neither Castaño-Muñoz et al. (2018), Laurillard (2016) or the other examples mentioned here examine the long-term impact of MOOCs on educators' practice and on other stakeholders, such as MOOC participants' educator colleagues and students taught by the MOOC participants. Indeed, Castaño-Muñoz et al. (2018) suggest that future research should "go beyond…descriptive analysis and measure the real impact [of MOOC participation] on teaching practices and efficacy of the educational systems" (p. 622).

2.1.3 Evaluations focused on MOOCs as networks

As previously discussed, MOOC evaluations to date have tended to focus on the effectiveness of courses' structure, content and pedagogy, as evidenced in learners' completion rates and levels of participation, and in learners' accounts of their feelings about the study experience. However, Stephen Downes (2013), co-creator of the first MOOC, argues that MOOCs should actually be evaluated for their success as networks:

> MOOC success...is not individual success. We each have our own motivations for participating in a MOOC, and our own rewards, which may be more or less satisfied. But MOOC success emerges as a consequence of individual experiences. It is not a combination or a sum of those experiences - taking a poll won't tell us about them - but rather a result of how those experiences combined or meshed together. (para 10)

This emphasis is particularly pertinent to the TEL MOOC evaluation in its alignment with the 'social presence' aspect of The Community of Inquiry approach used in the design of the course – social

presence being defined by Garrison (2009) as "the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities" (p. 352). An emphasis on MOOCs as networks also features in Patel et al's (2019) application of Wenger et al.'s (2011) value creation framework approach to the *Eliminating Trachoma* MOOC, as discussed later in this section.

While Downes is concentrating on courses' immediate impact on participants, the TEL MOOC evaluation is grounded in a similar assumption about the potential power of learner networks and, in part, is interested in the extent to which learners continue to participate in such networks after their study of a particular MOOC has ended, and the ways in which this networked participation may contribute to the long-term impact of a course. This focus aligns with King's (2019) assertion of the importance to teachers of "collaborative models of professional learning and dialogue" (p. 169) and the fact that despite critical dialogue being seen as one of the most important ways in which educators can develop their practice (Parker et al. 2016), teachers and teacher educators continue to struggle to find the time and space for "critical conversations" (Ryan, 2014, p. 360) and "complicated discussions" (Lopez, 2014, p. 323).

2.1.4 Evaluations of MOOCs' long term impact

As already noted, most MOOC evaluations tend to focus on the learning experience during a course rather than looking at long term impact on learners and other stakeholders. In their report of a protocol for a systematic review of MOOC evaluation methods Foley at al (2019) argue that:

> The longer-term impact of undertaking a MOOC must also be understood; at present there is little follow-up data gathered after the courses have concluded. This information is particularly needed when courses are designed to increase the knowledge or skills of a specific working population. (para 2)

While MOOC evaluations focusing on courses' long term impact on participants are uncommon, evaluations addressing MOOCs' long term impact on stakeholders beyond the participants themselves are even rarer. Indeed, Pickering & Swinnerton's (2017) report of a survey-based evaluation of an anatomy MOOC explicitly notes the lack of research exploring MOOCs' long term impact not only on learners themselves, but also on beneficiaries other than the learners (e.g. wider society). One reason for this may be the difficulties involved in measuring this type of impact, as evidenced in the small number of existing frameworks and models for MOOC evaluation, discussed in Section 2.2 below.

2.1.5 MOOCs' long term impact on professional practice

Returning to the topic of MOOCs' impact on professional practice, of those studies evaluating impact in the longer term, once again there is a noticeable focus on medical education and health contexts. For example, Sneddon et al (2010) offer a promising study aiming to investigate the value and potential impact of a MOOC on antimicrobial stewardship. However, their findings regarding long-term impact turn out to be limited by the research design:

> An implementation survey performed 6 months after completion of the first two courses was completed by 409 participants...from 41 countries. Of these respondents, 325 (79%) were healthcare workers...and 160 (49%) of them reported that they had implemented stewardship interventions since completing the course. Demographic details of the remaining 84 (21%) respondents who were not healthcare workers were not captured. The reported interventions that they had implemented correlated well with those reported in the post-course 'intention to implement' survey, but a limitation was that those who stated an intention were not necessarily those who responded to the implementation survey. (p. 1094)

Also focused on medical education, Alturkistani et al (2018) have evaluated the long term impact of a MOOC on Real World Evidence on participants' professional practice and on stakeholders other than the participants themselves. They conclude that "participants were not able to take skills from the MOOC and apply them to daily life" (p. 33), explaining:

> In general, MOOCs can improve learning and knowledge attainment in practical skills-based knowledge...In terms of knowledge application, support and availability of the right resources in the workplace are essential because learners are not able to apply learning in their workplace if lacking the right resources and support. Developers of MOOCs for continuing professional development should take into consideration work-related barriers when designing their MOOCs. (p. 33)

Alturkistani et al's (2018) mention of "work barriers" and their significance in limiting MOOC learners' application of gained knowledge and skills touches on a vital aspect of any MOOC evaluation - the identification and consideration of contextual factors that may be enabling or inhibiting the long term impact of a particular course on learners' attitudes and behaviour, and on stakeholders beyond the MOOC participants themselves. This is a key area of focus for the TEL MOOC evaluation, as discussed in Section 3.3 of this report.

Finally, and most recently, Patel et al. (2019) offer a thoughtfully designed impact evaluation for the *Eliminating Trachoma* (ET) MOOC developed by London School of Hygiene and Tropical Medicine and collaborators. The evaluation comprised a mixed methods study featuring an online survey (N=76) and interviews to explore the impact of the ET MOOC on participants' professional practice and on other stakeholders, and any context-specific factors that may be limiting impact. Patel et al. (2019) report impact in the form of changes to participants' confidence and practice, and in terms of knowledge transfer amongst participants' networks. The approach used covers similar areas to that featuring in the TEL MOOC evaluation, as discussed in Section 2.2 of this report.

2.2 Considering context in MOOC evaluations

Contextual factors are of relevance to any evaluation of the long-term impact of a MOOC in at least three respects:

- In affecting participants' experience of studying that MOOC
- In enabling the impact of the MOOC
- In inhibiting the impact of the MOOC

Of the studies focusing on learners' experience *during* their study of a particular MOOC, several consider contextual factors. Fini (2009), Haggard (2013 and Koutropoulos and Zaharias (2015) have identified context-related barriers to participation including non-relevance of the content offered, the languages of instruction, the diversity of learning needs, and cultural differences in pedagogy, while Bonk and Lee (2018) and Jain (2018), amongst others, have discussed technology- and internet access-related barriers to participation in MOOCs. Henderikx et al.'s (2019) study of the factors influencing the pursuit of personal learning goals in MOOCs gives a useful summary of the barriers to MOOC participation that have been identified to date (p.189).

Henderikx et al. (2019) expand on existing research in investigating whether learners' age, gender, educational level and online learning experience are predictive of the barriers they experience while studying MOOCs. However, their study is limited in only focusing on demographic factors and the quite abstract concept of "workplace issues" and "family issues" (p. 189), which don't get unpicked in their quantitative study. In addition, in providing statistical generalisations across the large, diverse cohorts that are typical of MOOCs, Henderikx et al. miss the opportunity to identify the influence of external factors on learners' study experience, and the extent to which those factors differ across contexts and between individual learners.

The importance of considering context is a central theme in Hood, Littlejohn and Milligan's (2015) quantitative exploration of a Data Science Coursera MOOC – an exploration which addresses the impact of self-regulated learning levels on learners' performance. While learner performance, in itself, is outside the scope of the TEL MOOC long term impact evaluation, it is relevant that Hood, Littlejohn and Milligan propose that learner self-regulation varies depending on learner context, and that learners with high self-regulation scores are more likely to apply their MOOC learning to their professional practice. They conclude that their study "provides empirical evidence that a learner's current context and role influences their learning in a MOOC" (p. 90), that levels of self-regulation can help explain variance in learners' practice when studying a MOOC, and that learners who are already working in the area that is the focus of a specific MOOC, or are also formal higher education students, are more likely to apply their newly acquired knowledge to their professional role and, in their study, appeared more highly self-regulated than other learners. Future research building on the TEL MOOC evaluation findings detailed in the current report will consider the possibility of correlation between employment and/or formal study status and long-term impact in terms of changes in attitudes and behaviour connected with professional practice.

Despite the obvious importance of considering context as part of a long-term impact evaluation, very few studies collect context-specific data or analyse the significance of context-related factors as enablers/inhibitors of change. As a consequence, such context data-poor evaluations inevitably paint an incomplete picture of the complex mechanisms of change resulting in/preventing long-term impact in diverse settings, and of variances between courses and between individual learners. Such investigations were an important priority for the TEL MOOC evaluation and informed the choice of evaluation approach, as discussed in Section 3 of this report.

2.2.1 Learning from SoTL studies

The lack of a focus on context is not unique to MOOC evaluations. Discussing Scholarship of Teaching and Learning (SoTL), Peter Looker (2018) observes a West/rest of world divide within SoTL studies, with the former being the focus of many more studies than the latter. Relevantly, Looker notes a tendency for SoTL studies emanating in the West to be presented as "central" and "unmarked" (p. 116) – not linked with a particular context beyond a specific classroom setting, containing minimal contextual description of anything beyond that classroom, and presenting their research findings as universally applicable. In contrast, suggests Looker, studies from elsewhere in the world are presented as "at the periphery", and "marked" (p. 117) – their geographical and cultural context very much foregrounded. Bearing in mind the dominance of MOOC evaluations covering provision emanating from the Global North, it could be that the phenomenon Looker identifies is being replicated in MOOC research.

Looker argues that studies should "contextualise the teaching context" (p. 121), explaining that "enlarging the scope of evidence and shifting the space within which enquiry takes place" (p. 116) to look at the many external factors influencing teaching and learning can increase the transferability of SoTL studies' conclusions to other settings, thereby enhancing their value. Staying with the discipline of SoTL, Gibbs (2010) has also argued that SOTL studies should pay more attention to a wider range of contextual factors, ranging beyond the classroom to provide additional information that enables readers to understand the limits of a study's application to other settings. The TEL MOOC evaluation is intended, in part, to contribute to developing an appropriate methodology for evaluating MOOCs' long term impact in the diverse contexts represented by similarly diverse learners, in order to maximise the value of the study across education sectors and settings.

2.3 MOOC evaluation frameworks and models

The complexity of evaluating MOOCs, with their massive cohorts of informal open learners and online format, necessitates use of a defined evaluation framework. This is particularly important for evaluations of long term impact, where nuanced causality relationships need to be unpicked and mechanisms of change, including the impact of contextual factors, identified. Few MOOC evaluation reports use structured evaluation frameworks, however.

For courses such as TEL MOOC, intended to benefit stakeholders additional to participants themselves, for example by increasing educational quality and equity, evaluation of long-term impact is a vital mechanism for maximising the efficacy of those courses and attracting future funding. As such, having a rigorous and systematic, but suitably flexible evaluation framework is particularly important in allowing researchers to fully capture and understand the mechanisms of change involved in and the complexities of establishing causality.

As noted in Section 1, the TEL MOOC evaluation was focused on answering the following questions:

- What is TEL MOOC's impact on participants' attitudes and behaviour, especially their subsequent use of technology-enabled learning (TEL), open educational resources (OER) and open educational practices (OEP)?
- How does this impact vary across diverse contexts?
- What factors have contributed to and/or limited this impact, and how do they differ across diverse contexts?
- What is TEL MOOC's impact on stakeholders other than the participants themselves, for example on those participants' colleagues and peers, on learners taught by those participants, on institution leaders, and on society more generally?

To answer these questions, the evaluation framework needed to:

- Identify the diverse needs of multiple stakeholders, beyond the MOOC participants themselves, in order to fully establish the long term impact of the course.
- Allow for consideration of a wide range of contextual factors that may enable/limit impact.
- Allow for analysis of complex mechanisms of change.
- Allow for consideration of multiple interpretations of causality.
- Allow for both quantitative and qualitative evidence to be used as support for the evaluation.
- Offer the flexibility for iterative refinement in light of emergent findings and for multiple stakeholders in diverse settings.

The process of developing an evaluation framework for TEL MOOC involved first considering the merits and limitations of existing MOOC evaluation frameworks, of which there are few.

2.3.1 Kirkpatrick's model

Kirkpatrick (1975) offers a commonly used model for evaluating the efficacy and adoption of educational interventions. Originally designed for evaluating training programmes, Kirkpatrick's model comprises four levels:

- reaction - learners' feelings about the learning experience;
- learning - the resulting increase in knowledge or skill resulting from the learning experience;
- behaviour - the implementation of acquired knowledge/skills in employment/other contexts;
- results - the broader impact of the training on an organisation (or, by extension, any other environment or stakeholders, though this is not covered in Kirkpatrick's original model).

Several MOOC evaluation studies have adopted Kirkpatrick's model, including Goh et al (2018), who focus solely on the first two levels of the model in their evaluation of the design and implementation of MOOCs produced by Taylor's University, Malaysia. Of potentially greater relevance to the TEL MOOC evaluation is Alturkistani et al's (2018) study, mentioned already, which uses (to varying extents) all four levels of the Kirkpatrick model in a medical education setting as the basis for a mixed methods evaluation of the long term impact of a MOOC on Real World Evidence on participants' practice and on other stakeholders. Using semi-structured interviews, the study sought to identify whether MOOC participants were able to apply the skills learnt in the MOOC in their study or workplace (adoption) and if through participating in the MOOC they were able to influence their broader community (efficacy).

As already discussed, the study findings were ultimately limited by the short length of time between learners' completion of the studied MOOC and the evaluation interviews taking place, and the fact that the sample comprised just two participants. As a consequence, Level 3 of Kirkpatrick's model was covered only scantly and Level 4 not at all. While the authors' mention of the impact of "work-related barriers", also mentioned earlier, is a step in the right direction in respect of considering the significance of contextual factors in terms of the long-term impact of MOOCs, Alturkistani et al's investigation is still narrowly focused on the work environment rather than covering a broader range of context-related considerations that may have enabled and/or limited the evaluated course's impact. In part, this may be due to the fact that the study features just two participants and therefore offers very little opportunity to compare different contexts. However, the narrow focus can also seen as indicating a weakness of Kirkpatrick's model, which offers no obvious place for investigating nuanced contextual considerations.

Lin and Cantoni (2017) also cover all four levels of Kirkpatrick's model in their mixed methods evaluation of a Tourism MOOC, assigning twelve indicators to the four levels of evaluation. Following in the footsteps of Tracey et al (2016), who also used Kirkpatrick's model as the basis for developing a framework for evaluating MOOCs in applied hospitality and tourism settings (but did not apply this framework), Lin and Cantoni used data collected via surveys, interviews and social media analysis to support their evaluation. Their evaluation report suggests that the approach of assigning indicators to the four levels was effective to some extent. However, the Kirkpatrick model does not directly address the significance of contextual factors in enabling or inhibiting impact at Levels 3 and 4, and consequently this topic is not addressed in Lin and Cantoni's report. Nor does the report consider alternative causes for the changes reported by the MOOC participants/contributory factors, or barriers that may have limited impact/change in particular contexts, again a significant limitation of the evaluation.

Returning to the need for a framework within which to structure the TEL MOOC evaluation, at first glance Kirkpatrick's categories of 'behaviour' and 'results' appeared of interest for the current study. However, Kirkpatrick's model does not offer a particularly nuanced approach to analysing the complex relationships between cause and effect, nor to capturing and understanding the impact of context (and distal variables) on learners' experiences, and on changes in their attitudes and behaviour. It offers little potential as a basis for understanding and comparing how mechanisms of change differ for individual learners and does not offer a particularly helpful way of measuring long term impact in terms of diverse stakeholders' equally diverse outcomes.

2.3.2 The MOOCKnowledge model

Another model considered as the basis for the TEL MOOC evaluation has potential value in placing more emphasis on the significance of contextual factors than is allowed by Kirkpatrick's approach - the model developed by Kalz et al (2015) in connection with the MOOCKnowledge project. Kalz et al.'s model (Figure 1) conceptualises "the impact of socio-economic background variables, ICT competences, prior experiences and lifelong learning profile, variance in intentions, environmental influences, outcome expectations [and] learning experience" (p. 62) on learners' MOOC study outcomes.

Kalz et al (2015) base their study on the 'reasoned action approach' elaborated by Fishbein and Ajzen (2010) - an integrative framework for the prediction (and change) of human social behaviour based on the notion that attitudes towards behaviour, perceived norms, and perceived behavioural control determine people's intentions, while people's intentions predict their behaviours. Their model maps the background (or distal) variables that may account for variances in MOOC learners' attitudes and behaviour. These distal variables exist at "an individual level, a social level, and a task level" and include "demographic data, the socio-economic status of the participants, their lifelong learning profile, previous experiences with open online courses and IT competences" (p. 67). The model also maps the proximal variables that directly influence learner intention and behaviour,

identified as attitude, perceived norm and perceived behaviour control (i.e. self-efficacy) (following the reasoned action approach).

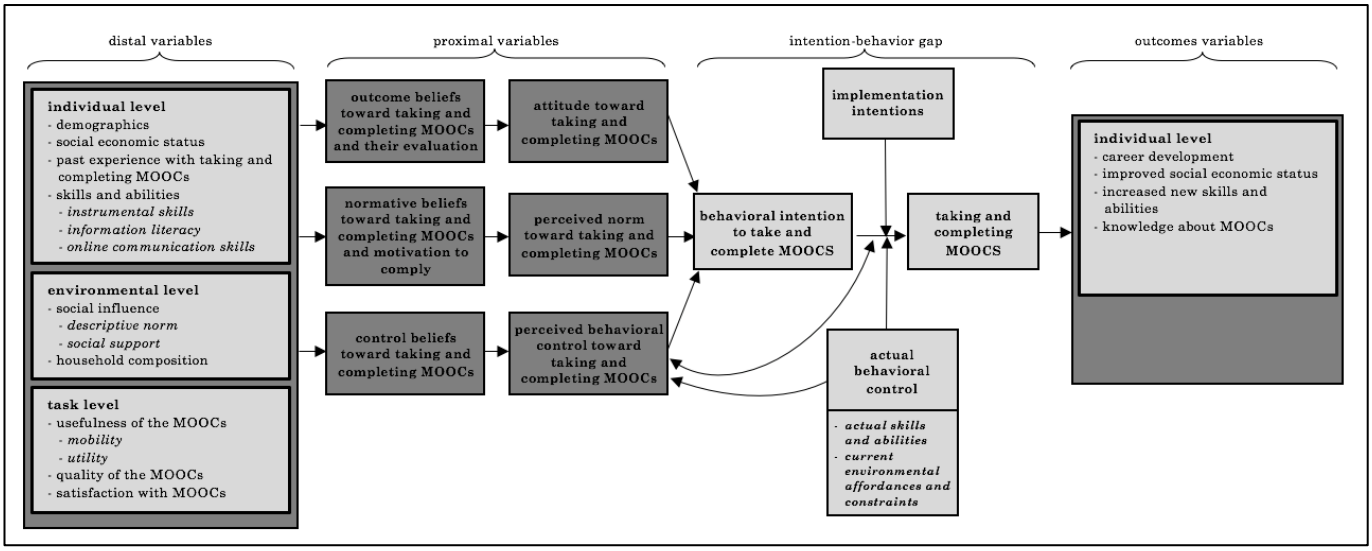

Figure 1: Research model of the MOOCKnowledge project (Kalz et al, 2015, p. 67).

The MOOCKnowledge model has some relevance for the evaluation of TEL MOOC's long-term impact on participants in identifying variables that may explain variances between the extent to which MOOC study has influenced learners' subsequent practice and related variance in even longer-term impact on other stakeholders in diverse contexts. As such, the model has the potential to help in identifying factors that are beyond MOOC providers' control, but which could compromise the intended long-term impact of a particular course. However, the model is limited in the fact that the identified proximal and distal variables are largely restricted to intrinsic factors, rather than extrinsic factors such as socio-cultural, political, geographical and economic context, and infrastructure constraints such as internet connectivity and the availability of resources such as up-to-date and reliable hardware and software. Arguably this is a major shortcoming in respect of applying the MOOCKnowledge model to evaluations of heterogeneous cohorts comprising learners from very diverse contexts. In addition, the model has been used by Kalz and colleagues for solely quantitative analysis (e.g. Henderikx et al., 2019; Castaño-Muñoz et al,, 2018) and it is not obvious how it well it would work with a mixed methods, case study-based approach such as that adopted for the TEL MOOC evaluation.

2.3.3 Douglas et al.'s Contextualised Evaluation Framework

As already mentioned, a key priority for the TEL MOOC impact evaluation was investigating the influence of context-related factors in inhibiting or enabling mechanisms of impact. The 'Contextualised Evaluation Framework' devised by Douglas et al. (2019), although not directly focusing on long term MOOC impact, was still of interest. Douglas et al. explain that their Framework is:

> Based on the understanding that evaluation questions as to the overall worth of MOOCs (and any individual MOOC), can only be addressed by answering questions concerning the background and context of MOOCs, stakeholder values (specifically in terms of the basis for claims of quality or merit), MOOC learner characteristics and values, and the resources available to create MOOCs. A thorough understanding of context, stakeholder and learner values, and resources, can then be used to interpret course characteristics and learners' interactions (behavior and outcomes) within a course. (p. 205)

Douglas et al (2019) explain that the Contextualized Evaluation Framework, "includes a theoretical perspective that, in an open educational context, learner characteristics (e.g., intentions for learning content, level of preparedness for content, current career state, socio-economic demographics) and course characteristics (e.g., content, pedagogy, instructional design) influence learner behavior and ultimately the learning outcomes" (p. 206).

While Douglas et al. make important points about the need to identify and consider multiple dimensions of learner context, and the values and intended outcomes of all stakeholders, their framework is limited to modelling the relationship between learner and course characteristics, learner behaviours and learner outcomes in a very general sense, and lacks the detail necessary to be the basis of a comprehensive long-term impact evaluation. Even so, it has influenced the TEL MOOC evaluation in terms of the inclusion of survey and interview questions intended to investigate TEL MOOC stakeholders' values and intended outcomes, and the extent to which the impact of TEL MOOC reflects those values and outcomes.

2.3.4 Wenger et al's Value Creation Framework adapted for MOOC impact evaluation

A MOOC evaluation approach that has been particularly influential in terms of the TEL MOOC impact evaluation study is Patel et al.'s (2019) adaptation of Wenger et al.'s (2011) Value Creation Framework (VCF) for use in evaluating the *Eliminating Trachoma* MOOC produced by London School of Tropical Hygiene and 37 international collaborators. Wenger et al. (2011) originally developed their VCF as a conceptual foundation for promoting and assessing "the value of the learning enabled by community involvement and networking in communities and networks" in a way that "links specific activities to desired outcomes" (p. 7) and can triangulate multiple sources of qualitative and quantitative data. Their VCF comprises 5 cycles:

Cycle 1. Immediate value: Activities and interactions "considers networking/community activities and interactions as having value in and of themselves" (p. 19).

Cycle 2. Potential value: Knowledge capital – addresses value that is not immediately realised, and which may take several forms:

- Personal assets (human capital), for example "a useful skill, a key piece of information…a new perspective…new ideas…inspiration, caring, confidence, and status" (p. 20).
- Relationships and connections (social capital).
- Resources (tangible capital), including "specific pieces of information, documents, tools and procedures, but also increasingly networked information sources, tag clouds, mind maps, links and references, search capabilities, visualization tools, and other socio-informational structures that facilitate access to information" (p. 20).
- Collective intangible assets (reputational capital), including "the reputation of the community or network, the status of a profession, or the recognition of the strategic relevance of the domain" (p 20).
- Transformed ability to learn (learning capital), specifically to learn through participating in a facilitated network or a community.

Cycle 3. Applied value: Changes in practice
Wenger et al (2011) explain that "knowledge capital is a potential value, which may or may not be put into use…Looking at applied value means identifying the ways practice has changed in the process of leveraging knowledge capital" (p. 20).

Cycle 4. Realized value: Performance improvement
Wenger et al (2011) point out that while "one would expect the application of new ideas to practice or the use of resources from the community/network to result in improvements in performance…this is not guaranteed. It is therefore important…to reflect on what effects the application of knowledge capital is having on the achievement of what matters to stakeholders" (p. 20).

Cycle 5. Reframing value: Redefining success
In this final cycle of value creation, "social learning causes a reconsideration of the learning imperatives and the criteria by which success is defined" (Wenger et al., 2011, p. 21).

Table 1 shows Patel et al's (2019) adaptation of Wenger et al.'s (2011) framework for use in their impact evaluation of the *Eliminating Trachoma* MOOC. In a summary of the evaluation findings, both qualitative and quantitative data are used to support investigation for each cycle.

Table 1: Patel et al.'s (2019) application of their adapted Value Creation Framework to the Eliminating Trachoma MOOC adaptation

Cycle 1 Immediate value	What happened during participation? • Level and kinds of participation: • Quality of interactions • Use of resources • Networking • Personal value of MOOC learning • Barriers
Cycle 2 Potential value	What changed as a result? • Skills and/or knowledge acquired/ confidence • Change of view • New social connections • Experience with online learning • Barriers
Cycle 3 Applied Value	What difference has participation made? • Use / reuse of skills, knowledge, connections or materials from the course • For trachoma elimination or in another personally relevant sphere • Barriers/ enablers
Cycle 4 Realized Value	Is there evidence of sustained difference to self-ability or to an eliminating trachoma programme? • Increased effectiveness or quality or outputs • New achievements • At personal or organisational levels • In trachoma elimination or other in another personally relevant sphere
Cycle 5 Transformational value	Has understanding of what is important changed directly because of the course? • At personal or organisational levels

The TEL MOOC evaluation covers VCF cycles 2, 3, 4 and 5, embedded within a broader theory of change approach, discussed next.

2.3.5 The Theory of Change approach

The frameworks and approaches outlined above each have value and were stepping stones en route to the adoption of a theory of change (ToC) approach as the basis for the TEL MOOC evaluation, due to its affordances in offering a systematic framework for investigating the complex relationship between cause and effect that must be unraveled when conducting a long-term impact study. The ToC approach fits within a broader strategy of contribution analysis, as discussed in detail in Section 3.

The ToC approach is commonly used in international development evaluation (see Vogel, 2012) and was developed by Weiss (1995) within the tradition of theory-driven evaluation - a collection of evaluation methods emphasising the need to understand how a programme or intervention works, as the basis for evaluating the ways in which it achieves (or does not achieve) an intended outcome/impact. A key value of ToC is their making explicit the conditions and assumptions required to enable change, and their dynamic and iterative nature; ToC are intended to be revised throughout the evaluation process as understanding of a programme or initiative changes. Developing a ToC allows practices to be linked to outcomes, and in identifying assumptions a ToC gives priority to the reasons why impact may not be achieved, as well as the drivers of impact.

Breuer et al (2016) explain that:

> The ToC is often developed using a backward mapping approach which starts with the *long-term outcome* and then maps the required *process of chang*e and the short- and medium-term outcomes required to achieve this. During this process, the *assumptions* about what needs to be in place for the ToC to occur are made explicit as well as the *contextual* factors which influence the ToC. Additional elements of a ToC can include *beneficiaries*, *research evidence supporting the ToC*, *actors in the context*, *sphere of influence*, *strategic choices and interventions*, *timelines* and *indicators*. These elements are usually presented in a diagram and/or narrative summary. (p. 2)

The TEL MOOC mixed methods study, combining survey research with qualitative interviewing, is intended to identify possible patterns in the impact of the course across cohorts, in addition to collecting rich evidence about the experiences of individual learners on a case study basis. The majority of data collected about the apparent impact of TEL MOOC comprises value reporting and observational/anecdotal evidence, together with a deep exploration of context-related factors that may influence any apparent/lack of impact in each case study. A ToC offers a way of placing this evidence into a framework that allows for comparison across cases, representing some of the diversity of MOOC cohorts, in respect of the mechanisms of change and varieties of long-term impact evident in each case.

While development projects often develop a ToC as part of the project planning process, the TEL MOOC evaluation ToC was developed in two phases – speculatively, informed by existing literature, in advance of conducting the research, and then in more detail in light of the survey and interview findings, as a way of understanding the impact mechanisms in individual cases. The evaluation process also involves iterative refinement of the ToC framework in the light of new findings - a bringing together of the outcomes of each case study, and of the survey results, to allow for any commonalities and patterns to be identified. Figure 2 shows the draft ToC devised at the start of the TEL MOOC evaluation as the basis for identifying variables that would help to answer the evaluation questions, and developing the survey and interview questions used to collect data about those variables.

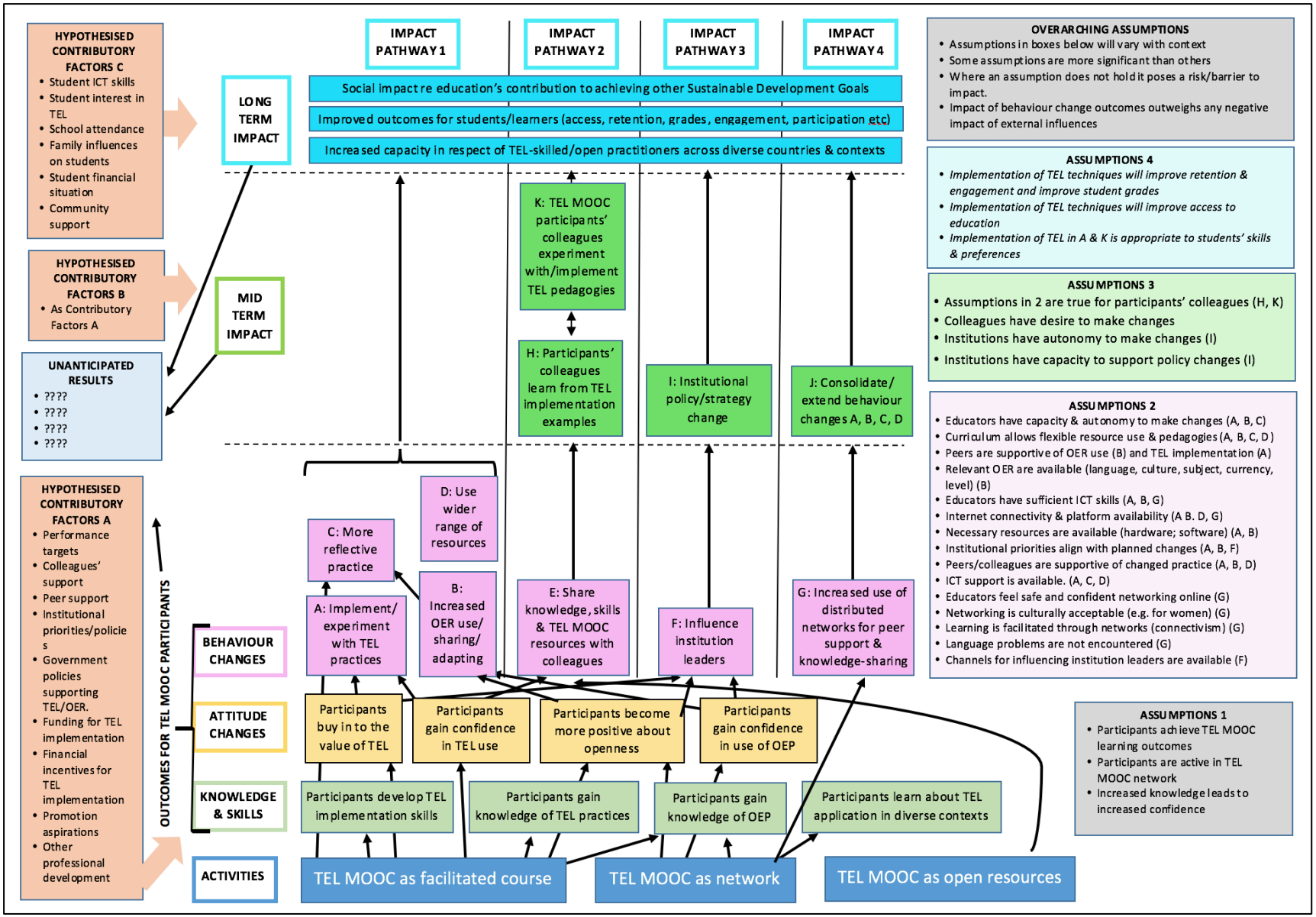

Figure 2: The draft TEL MOOC theory of change

3. The draft TEL MOOC ToC

The TEL MOOC draft ToC features the following components:

- Three categories of activity contributing to any identified impact – TEL MOOC as a facilitated course, as a network (following Wenger et al., 2011; Garrison, 2009; and Downes, 2013), and as downloadable and shareable open resources.
- Four Impact Pathways indicating hypothesized mechanisms of short-, medium- and long-term impact on MOOC participants and other stakeholders, grounded in related literature.
- Three sets of contributory factors hypothesized to account for some of the impact identified in the evaluation.
- Five sets of assumptions assumed to be true for the hypothesised impact to be realised, and a risk to achieving impact, where an assumption is not true.
- One set of 'unintended consequences' – a place for recording outcomes and impact other than that hypothesised in the Impact Pathways.

3.1 The Impact Pathways

The four possible Impact Pathways are based on four related hypotheses:

Pathway 1: TEL MOOC participants make changes in their own practice as a direct result of their study of the course (and any contributory factors), leading to longer-term impact on learners and on society more generally. This pathway encompasses Cycles 3 and 4 of Wenger et al.'s (2011) VCF as adapted by Patel et al. (2019).

Pathway 2: TEL MOOC participants share knowledge, skills and resources with colleagues, who are also influenced by participants' change in practice, leading to practice changes for colleagues and subsequent longer-term impact on learners and society. This pathway is, in part, connected with the use of a Community of Inquiry approach to the design of TEL MOOC and encompasses Cycles 3 and 4 of Wenger et al.'s (2011) VCF.

Pathway 3: TEL MOOC participants influence institution leaders, leading to institution-wide policy/strategy change, and long-term impact on learners and society.

Pathway 4: TEL MOOC participants' learning is enhanced by their being part of a massive cohort of MOOC learners, functioning as a community of practice/network (see Wenger, 1998; Wenger et al., 2011; Downes, 2013) within which participants develop social presence – the ability to "identify with other people in the community, communicate purposefully in a trusting environment, and develop interpersonal relationships by way of projecting their individual personalities" (Garrison, 2009, p. 352). They gain networking experience and skills, and make connections that last beyond their study of the course and are a source of peer support as they experiment with the application of their newly gained skills and knowledge to their own practice.

3.2 The 'contributory factors': Considering causality

The TEL MOOC evaluation combines a "contribution-oriented" (Stern et al., 2012, p. 38) approach investigating "the contribution an intervention is making to outcomes and wider impacts" (Gates and Dyson, 2017, p. 31) with a "realist evaluation" strategy focusing on "building and verifying a theory about how processes and mechanisms work in particular contexts to generate effects and changes" (Gates and Dyson, 2017, p. 31). Accordingly, the TEL MOOC draft ToC features three clusters of 'contributory factors' – one cluster of factors making a potential contribution to the impact of TEL MOOC on participants themselves, a second cluster making a potential contribution to impact on participants' colleagues and peers, and a third making a potential contribution to the impact on stakeholders other than the course participants and their colleagues. The inclusion of these contributory factors in the ToC is informed by current thinking around causality in impact evaluation.

Some critics of ToC (e.g. Hawe, 2015) warn that they can simplify what is likely to be a complex reality and that "a simple model applied to a complex situation risks overstating the causal contribution of the intervention" (p. 115). Indeed, a key challenge when conducting a long-term impact evaluation, whatever the framework used, is establishing whether reported and observed phenomena such as changes in attitudes, behaviour and identifiable stakeholder outcomes are attributable to the intervention being evaluated. The discussion of causality is rarely addressed in MOOC evaluation studies and is not that common in other educational evaluations. However, there is growing interest in the topic in evaluation research more generally.

Gates and Dyson (2017) offer a detailed guide to how issues of causality might be addressed in various types of evaluation, arguing that "evaluators need to take up some new ways of thinking about and examining causal claims in their practices" (p. 31) by:

(1) "being responsive to the situation and intervention";
(2) "building relevant and defensible causal arguments";
(3) "being literate in multiple ways of thinking about causality";
(4) "being familiar with a range of causal designs and methods";
(5) "layering theories to explain causality at multiple levels";
(6) "justifying the causal approach taken to multiple audiences". (p. 31)

The TEL MOOC evaluation strategy is guided by these principles, especially in respect of the use of theory, the choice of causal design and the chosen combination of evaluation methods. In addition, the discussion that follows addresses guideline 6 above – "justify the causal approach taken to multiple audiences". Gates and Dyson (2017) note that "in the face of the predominance of experimental designs and counterfactual logics and given the multitude of ways of thinking about and methodological approaches to causality, evaluators ought to be prepared to justify the causal approach taken to multiple audiences" (p. 42) as key stakeholders, and the wider public, are likely to be unfamiliar with the range of ways of thinking about causality and relevant designs and methods for warranting causal claims.

Gates and Dyson (2017, p. 36) identify five ways of thinking about causality - successionist, narrative, generative, causal package and complex systems. The TEL MOOC evaluation combines a narrative, generative and causal package approach.

The narrative approach foregrounds "the importance of human agency in causality by attending to human perception, motivation and behaviour" (Gates and Dyson, 2017, p. 35), viewing participants as "active agents" (Stern et al., 2012) with different values and different outcomes, and treating context not as a variable that should be controlled for, but as "an important factor in determining whether a program will work in a certain setting" (Gates and Dyson, 2017, p. 35). The case study strategy used for the TEL MOOC evaluation, discussed in Section 4, follows a narrative approach, allowing for evaluation of individual learners' experiences.

The generative approach involves building and verifying a theory-based explanation of how causal processes happen - identifying mechanisms that connect two events as a means of "understanding why, for whom, and under what conditions interventions work to produce specific results" (Gates and Dyson, 2017, p. 36). The use of a ToC approach is generative in nature.

Finally, the causal package approach involves "examining the contributory role components of interventions and combinations of multiple interventions play in producing outcomes and impacts" based on the idea that "many interventions do not act alone, and the desired outcomes are often the result of a combination of causal factors, including other related interventions, events, and conditions external to the intervention (Mayne, 2012)" (Gates and Dyson, 2017, p. 36). As already mentioned, a key feature of the TEL MOOC evaluation is its adaptation of the ToC approach to align with the principles of contribution analysis, discussed next.

3.2.1 Contribution analysis

Contribution analysis, developed by John Mayne in the early 2000s, is a methodology used to identify the contribution an intervention – such as a development project or programme – has made to one or more changes that might be identified as that programme's impact in the short-, medium- and long-term. The approach has variously been used for development programme evaluation (e.g. Kotvojs, 2006) but is rarely mentioned in MOOC evaluation studies.

Contribution analysis is based on a recognition that it is difficult to prove attribution for many interventions. Mayne (2012) explains that this is because there are usually many different steps between activities and the eventual desired changes, outcomes and impact, external factors will influence those changes, and many different interventions can contribute to a single change. Contribution analysis is particularly useful in circumstances where there are many different contributors to change.

INTRAC (2017) explain that:

> Normally…theories of change are developed as pathways showing how change at one level contributes to change at further levels (i.e. how activities lead to outputs, intermediate outcomes, higher outcomes and eventually impact). In contribution analysis, changes are assessed at all these different levels in order to compare reality with the theory. Contribution analysis does not seek to conclusively prove whether, or how far, a development intervention has contributed to a change or set of changes. Instead it seeks to reduce uncertainty. The aim is to produce a plausible, evidence-based narrative that a reasonable person would be likely to agree with (Mayne 2008). (p. 1)

Mayne (2008, p. 1) proposes that within contribution analysis, a narrative may be considered plausible narrative when four different conditions are met:

> 1. The development intervention is based on a sound theory of change, accompanied by agreed and plausible assumptions, that explains how the intervention sought to bring about any desired changes
> 2. The activities of the development intervention were implemented properly.
> 3. There is adequate evidence showing that change occurred at each level of the theory of change.
> 4. The relative contribution of external factors or other development interventions can be dismissed or demonstrated.

In its use of a theory of change framework, adapted to fit with the principles of contribution analysis, case studies with data collected via qualitative interviewing, comparison of impact mechanisms across diverse case studies and contexts, and consideration of influences on participants' attitude and behaviour changes other than their study of TEL MOOC itself. the TEL MOOC evaluation is able to answer the following general questions:

- According to participants, what difference did TEL MOOC make for their lives, and especially their professional practice?
- More generally, what works, why, how, for whom and under what circumstances?
- How does TEL MOOC work in combination with other interventions or factors to make a difference?

3.3 Assumptions: Considering context in MOOC evaluations

TEL MOOC evaluation's narrative approach to causality involves considering the significance of multiple contextual factors in both driving and inhibiting impact on participants and other stakeholders in specific settings. These factors are represented as 'assumptions' in the draft ToC, and are informed by various studies addressing the influence of context on MOOCs' short-term and

longer-term impact, as discussed in section 2.2 above, and by studies investigating factors enabling and inhibiting the implementation of TEL and the use of OER, summarised here.

3.3.1 Assumptions regarding the implementation of TEL

An overarching aim for TEL MOOC is to develop participants' professional practice in respect of the use of technology-enabled learning (TEL). The TEL MOOC ToC assumptions therefore needed to address contextual factors that may act as barriers to and/or enablers of TEL implementation. The literature on this topic is fairly extensive and is summarized by Thanaraj and Williams (2016). Identified factors driving and/or enabling TEL implementation include "rewards such as a feeling of accomplishment and personal satisfaction" (Larson, 2005, p. 104), academics' experience and their expertise with the technology (Lane and Lyle, 2010) and the impact of government policies and legislation (Aarons et al. 2011; Feldstein and Glasgow 2008; Mitchell et al. 2010). Solomons and Spross (2011) identify individual characteristics such as skills and experience of staff, innovativeness, tolerance of ambiguity and propensity towards risk taking as associated with increased adoption of TEL, while Josefsson et al. (2018) identify "collegial discussions, increased automatization, technology enhanced learning support for the teachers (to assist exploration), tech savvy students and engagement among faculty" (p. 1) as drivers for the implementation of TEL in higher education contexts.

Factors identified as inhibiting TEL uptake include lack of time (Berge et al. 2002; Maguire 2005; Solomon and Spross, 2011), increased workload (Maguire 2005; Major 2010); lack of autonomy and a lack of opportunity to access research (Solomon and Spross, 2011), lack of compensation (Berge et al. 2002), lack of IT support (Maguire 2005) and lack of academic staff knowledge (UCISA, 2010; UCISA, 2012). Sharpe and Beetham (2010) have identified the need for academics to understand how a particular technology operates, its stability and its reliability for delivering specified learning outcomes as key enablers to the adoption of TEL, a point echoed by Solomon and Spross (2011), while Gregory and Lodge (2015) identify "academic workload allocations…academic identity and culture, preferential time allocation to associative activities, academic technological capacity, university policies and workload and funding models" (p. 210) as barriers preventing the uptake, and implementation of TEL in higher education. More recently, Josefsson et al. (2018) have identified barriers to TEL implementation and uptake including "unclear return on time investment, insufficient funding for purchases and lack of central decisions" in addition to "inexperience with digital tools for learning" (p. 1), lack of faculty engagement, poor system integration, obstruction by central systems, problems with locally developed systems and a lack of collegial discussion. The above literature about barriers to/enablers of the implementation of TEL has informed the identification of related assumptions appearing in the draft ToC. Evidence about the existence of these barriers and enablers for specific learners has been gathered in both phases of the evaluation, as discussed in Section 4.

3.3.2 Assumptions regarding OER use and OEP

One of the main topic areas within TEL MOOC concerns the use of open educational resources (OER) and the evaluation was therefore concerned, in part, about whether participants' OER use changed following their study of the course. The literature on openness in education includes multiple studies identifying the significance of context-related factors in facilitating/inhibiting the use and impact of OER and open educational practices (OEP), especially for learners in the Global South.

For example, Perryman and Seal (2014) have devised a model mapping Indian learners' and educators' use of OER and OEP against technological barriers identified by respondents of a mixed methods, dual language survey. Perryman and De los Arcos (2016) discuss barriers faced by women, while Perryman et al. (2014), Buckler, Perryman et al. (2014), Perryman and Lesperance (2015) and Hodgkinson-Williams and Arinto (2017) have identified various barriers to educators' use of OER and OEP that may also apply to the study of MOOCs, including:

- finding OER relevant to geographical and cultural contexts, appropriate to local teaching styles and preferences and in local mother tongue languages
- slow/unreliable/lack of internet connection
- lack of/out of date computer hardware and software
- finding OER that are sufficiently good quality and/or up-to-date

Both phases of the TEL MOOC data collection process collect evidence relating to changes in participants' use of OER and OEP.

4. Study design and methods

Foley et al (2019) observe that:

> While the MOOC field is new territory, the means of evaluating MOOCs is newer still and a gap in knowledge exists with regard to the methodologies which should be used for evaluation…It is vital that appropriate methods are identified and available to determine the impact of these courses, a crucial but underresearched element. Aspects such as the effectiveness and quality of learning and impact of knowledge gained are vitally important in determining the strength of MOOCs as a learning tool, but there is not a substantial evidence base on methods for how these factors are measured or evaluated. (p. 2)

Despite the "gap in knowledge" about MOOC evaluation methods, trends can be detected. For example, Zhu et al (2017) report that only 18.5% of empirical studies on MOOCs adopt a qualitative methodology, with the majority tending to focus on quantitative, cohort-wide analysis of MOOC learners' experiences. Others have proposed that the reliance on quantitative methodology is pragmatic, grounded in the affordances of having access to analytics data pertaining to massive learner cohorts.

As a reminder, the TEL MOOC evaluation focuses on the following questions:

- What is TEL MOOC's impact on participants' attitudes and behaviour, especially their subsequent use of technology-enabled learning (TEL), open educational resources (OER) and open educational practices (OEP)?
- How does this impact vary across diverse contexts?
- What factors have contributed to and/or limited this impact, and how do they differ across diverse contexts?
- What is TEL MOOC's impact on stakeholders other than the participants themselves, for example on those participants' colleagues and peers, on learners taught by those participants, on institution leaders, and on society more generally?

The evaluation intended to answer these questions featured an explanatory sequential mixed methods design (Creswell, 2007) whereby an initial phase of quantitative research was followed by a phase of qualitative research intended to explain and further explore the quantitative findings. This research design was intended to combine the broad overview of diverse learners' experiences in equally diverse contexts that is possible via quantitative survey research with the deep insight into human experience that qualitative research makes possible. The evaluation also drew on the findings of three previous TEL MOOC evaluation studies (Cleveland-Innes et al. 2019; Cleveland-Innes et al., 2018; Cleveland-Innes et al., 2017), each focusing on learners' experiences and outcomes during their study of the course.

In contrast with the Sneddon et al. (2010) study discussed in Section 3.1.5, the TEL MOOC evaluation surveyed participants between 8 months and 2.5 years (depending on the presentation studied) after they had completed the course. The sequential mixed methods design allowed triangulation of the following types of data as a means of investigating TEL MOOC's contribution to

the impact of the course on participants' practice, the mechanisms of change operating in each case, and possible factors enabling and inhibiting impact:

- Demographics information;
- Survey-derived attitude, belief and experience statements;
- In-depth evidence gained through qualitative interviewing (for a group of case study participants, with their permission).

4.1 Phase 1: Survey research

In Phase 1, 1177 TEL MOOC participants who had either received a participation certificate or a completion certificate, and who had agreed to be contacted, were surveyed at least 8 months after completing the course. 214 people responded – a response rate of 18%. The TEL MOOC participants were asked about the apparent impact of their study on their subsequent attitudes and behaviour, and on other stakeholders. The survey questions are presented in Appendix 1. The survey findings allow conclusions to be reached regarding the ways in which learners have used the knowledge and skills gained from studying TEL MOOC across different countries, sectors and settings.

The Phase 1 survey was written in the English language and conducted online using the Survey Monkey platform. Potential participants were emailed an invitation. A consent letter was included at the beginning of the survey (Appendix 2), with a statement that continuing to complete the survey was indicative of consent for data to be used in the ways outlined in the consent letter. Survey respondents were also asked whether they were prepared to be interviewed.

The TEL MOOC survey was intended to generate quantitative and qualitative data about the ways in which TEL MOOC participants' practices, attitudes and behaviour appeared to have changed (or not changed) between 8 months and 2.5 years after completing the course. Accordingly, the survey was structured into the following sections:

1. Demographics: Age, gender, country of residence, highest educational qualification, primary spoken language and any teaching qualification.
2. Employment context, including job role, sector and length of teaching experience (if any).
3. Internet use and ICT skills/experience.
4. Online learning experience, building on the points made by Henderikx et al. (2019) about this being a predictor for certain barriers to successful MOOC study.
5. Motivations for studying TEL MOOC
6. Open educational practices/use of OER prior to studying TEL MOOC, allowing for nuanced comparison with OER use/OEP a year later.
7. Direct impact on MOOC participants, and especially on their professional practice, and factors that may have enabled this impact.
8. Professional development since completing TEL MOOC (to allow consideration of alternative explanations for apparent impact on the MOOC participants).
9. Factors limiting the impact of TEL MOOC on participants' professional practice, including their use of OER, and strategies used to alleviate them. These questions are informed by the literature identified in Section 2 of this report.
10. Impact on stakeholders other than the MOOC participants themselves, e.g. teaching colleagues, managers and learners taught by TEL MOOC participants.

The survey questions largely involve respondents self-reporting changes in their own attitudes and behavior, and in the attitudes and behaviour of/outcomes for other TEL MOOC stakeholders (for example participants' colleagues, managers and learners being taught by the participants). Some of the survey questions, notably those around OER use, are drawn from the open survey question

bank shared by The Open University's OER Hub project[4], allowing future comparison with other research using the same questions.

4.2 Phase 2: Case study research and qualitative interviewing

Pickering and Swinnerton (2017) have argued the need to focus on individual learners' outcomes, rather than the apparent success (or otherwise) of MOOCs across broad cohorts of learners:

> Currently, although much is known about the demographic profile of MOOC learners (Glass et al, 2016), measuring their actual impact is difficult. For example, interpretation of completion rates is difficult without knowing the motivations of the individual learners, and although MOOCs are known for their *massiveness*, within the abundance of data and statistics, there are *invisible learners* who will be on a personal journey that is specific to them (Veletsianos, 2015). Each of these individual learners will have their own specific goals, and attempting to measure the success, or otherwise, of MOOCs across broad profiles is particularly difficult, and perhaps unhelpful. Therefore, understanding the impact of MOOCs on these learners is the key to understanding their potential role and scalability. (p. 244)

The lack of research into the diverse nature of individual learner experiences in MOOCs, has also been noted by Veletsianos et al. (2015) and Veletsianos and Shepherdson (2015). Hood et al. (2015) concur that "the openness of MOOCs and the resultant potential diversity of learners, each with different base-line knowledge and prior experience, makes the investigation of individual learners particularly important" (p. 84). Phase 2 of the TEL MOOC evaluation therefore features a case study approach, with five individual TEL MOOC participants as cases. Qualitative interviews have been used to capture detailed information about specific learners' experiences and contexts as the basis for understanding TEL MOOC's contribution to changes in their attitudes and behaviour, and to the impact on stakeholders other than participants themselves.

4.2.1 The use of case study research

Timmons and Cairns (2010) suggest that case study research can "provide rich holistic data that contribute to the understanding of complex situations" (p. 102) while Mills, Europos et al (2010) explain that the characteristics of case study research include:

> A focus on the interrelationships that constitute the context of a specific entity (such as an organization, event, phenomenon, or person); analysis of the relationship between the contextual factors and the entity being studied, and the explicit purpose of using those insights (of the interactions between contextual relationships and the entity in question) to generate theory and/or contribute to extant theory. (p. xxxii)

Hijmans and Wester (2010) note that case study research "is conducted in a real-life context and...investigations produce a case-specific theory of the natural development of the processes involved", adding that "although case study research may start with the objective to test specified hypotheses, the greater part of these studies focus on diagnosis or evaluation of situations in a specific organizational context...informed by elaborated theoretical concepts and substantive ideas" (p. 179). With its focus on the generation/confirmation of theory, the use of a case study strategy for Phase 2 of the TEL MOOC evaluation aligns well with the overall ToC approach and the close examination of the mechanisms of change leading to possible long-term impact of TEL MOOC on participants and other stakeholders.

Yin (1993) identifies three types of case study: descriptive, exploratory and explanatory. The TEL MOOC evaluation adopts an explanatory approach. Harder (2010) explains that "using both

[4] https://docs.google.com/spreadsheets/d/1fL_yf-O70ZjvH67Ue8LlfidjEXwtDQ5T0TBe-Z1GYaI/edit#gid=0

qualitative and quantitative research methods, explanatory case studies not only explore and describe phenomena but can also be used to explain causal relationships and to develop theory" (p. 370) - again well aligned with the objectives of the TEL MOOC long-term impact evaluation, and especially the investigation of causality in diverse contexts.

4.2.2 Contextualisation and case study research

The importance of considering the significance of contextual factors within the TEL MOOC evaluation has already been addressed, and has informed the decision to use a case study strategy for Phase 2 of the evaluation. Elger (2010) points out that contextualisation is a central feature of case study design. He differentiates between external and internal contextualisation, explaining that the former "locates the case as a whole in the wider social context in which it operates" while the latter "locates any specific aspect of the case in the context of the overall configuration of social relations and processes characterizing that case" (p. 232). Both types of contextualisation are addressed in the TEL MOOC Phase 2 case studies.

4.2.3 The use of qualitative interviewing

The case studies of individual TEL MOOC participants are supported by evidence collected using qualitative interviews conducted via Skype and WhatsApp. The use of qualitative interviewing is grounded in a social construction worldview which holds that people construct their own realities on the basis of their interpretation of their personal experience, and that such perceptions and interpretations can be explored through research. Rubin and Rubin (2011) explain that through qualitative interviewing:

> Researchers explore in detail the experiences, motives and opinions of others and learn to see the world from perspectives other than their own … By listening carefully to others, researchers can extend their intellectual and emotional reach across a variety of barriers. …Qualitative interviewing helps reconstruct events the researchers have never experienced … By putting together descriptions from separate interviewees, researchers create portraits of complicated processes. (p. 3)

This approach was considered to be well suited for the TEL MOOC evaluation's exploration of complex mechanisms of change and especially the influence of multiple contextual factors on human attitudes and behaviour.

4.2.4 Phase 2 sampling

A "theoretical sampling" strategy (Warren, 2001, p. 87) whereby "the interviewer seeks out respondents who seem likely to epitomize the analytical criteria in which he or she is interested" was adopted for Phase 2 of the TEL MOOC evaluation. Warren (2001) notes that in order to "discern meaningful patterns within thick description", researchers using theoretical sampling might endeavour to "minimize or maximize differences among respondents...in order to highlight or contrast patterns" (p. 87). The criteria for the theoretical sampling strategy has emerged from analysis of the Phase 1 survey data and an explanation accompanies each case study.

4.3 Ethical considerations and their management

A researcher conducting a study covering a single country, conducted by researchers located in that country, would typically refer to ethical guidelines from a national body in order to guide them in responsible, ethical practice. The TEL MOOC impact evaluation study is a truly international endeavour, with the UK-based researcher investigating a MOOC designed and facilitated by collaborators based in Canada and featuring learners from 32 countries, each with their own approach to managing ethical considerations in educational research. As such, no single set of ethics guidelines was deemed sufficient for informing ethics-related decision making.

Rather, Farrow's (2016) overview of seven core principles that are common among guidelines for ethical educational research, presented in his article *A framework for the ethics of open education*,

was used as a focus for identifying and managing ethical considerations across the study. Farrow's seven principles are:

- Respect for participant autonomy
- Avoid harm and minimise risk
- Full disclosure
- Privacy and data security
- Integrity
- Independence
- Informed consent.

4.3.1 Respect for participant autonomy

The Economics and Social Research Council (ESRC) (2015) states that "research participants should take part [in a study] voluntarily, free from any coercion or undue influence, and their rights, dignity and (when possible) autonomy should be respected and appropriately protected" (p. 4). Accordingly, participants were informed that they were free to withdraw from the TEL MOOC evaluation study at any time, without any disadvantage. Several of the people interviewed for the five case studies asked for the questions in advance, stating that they felt more confident responding to written English than spoken English. In such instances, core questions were shared in advance, allowing participants to prepare their answers, and the interview comprised a review of, and more detailed probing of those answers.

A key consideration related to ensuring participant autonomy concerned power relations between the researcher and the research participants in respect of whether to anonymise the case study accounts. Typically, ethics guidelines stipulate universal anonymisation of research data. However, this imposes a choice on participants who may otherwise have little opportunity to promote their work globally, gain visibility and engage with the wider open education community. For this reason, the case study participants were each asked whether they wished their own name and identifying information such as their institution to appear in the research. Their wishes have been respected. For all other participants (the survey respondents), data was fully anonymised to prevent identification of individuals in the final openly published research report and any related dissemination outputs. The triangulation of survey and interview data reported in the Section 7 case studies was also conducted with permission of each case study participant.

4.3.2 Avoid harm and minimise risk

The TEL MOOC evaluation research instruments – the survey and interview questions – were designed to be pertinent and straightforward to answer, thereby minimising the time burden on participants. In particular, the interview questions focused tightly on areas of interest in order that the interview could be kept as short as possible. This was particularly relevant for participants with limited internet data for use on a Skype call. In interview, sensitive topics were handled with care and, before the study findings were reported, participants discussing such topics were asked to re-confirm they were comfortable for these matters to be covered in the final evaluation report.

4.3.3 Full disclosure

All participants for both phases of the evaluation study were informed in advance about the purpose of the research and what their participation would involve.

4.3.4 Privacy and data security

All data was securely stored in password-protected files. After the interviews were completed, all identifying markers from the survey data (e.g. email addresses and institution names) were removed from the dataset and from the interview transcripts to ensure participant anonymity.

4.3.5 Integrity

This evaluation study has been conducted in a rigorous manner, using quantitative and qualitative methods that are appropriate to the collected data and sample size. Participants' responses have been accurately represented and respondent validation by the case study participants has helped to ensure the veracity of the study findings. The Commonwealth of Learning and Athabasca University were given an opportunity to comment on the draft report. As outlined in 4.3.2 above, all efforts have been made to prevent any harm to participants.

4.3.6 Independence

The TEL MOOC evaluation was conducted by an independent researcher who has no connection with TEL MOOC, nor any formal connection with the Commonwealth of Learning or Athabasca University. The researcher has no conflicts of interest.

4.3.7 Informed consent

Survey participants' informed consent was gained via the initial email inviting them to complete the evaluation survey (Appendix 2), while a further email was used to gain informed consent from those participants who were interviewed (Appendix 3).

5. Findings: Demographics, educator characteristics, ICT skills/OER use, and motivation for study

214 people completed the survey – a sample featuring a 62.26% male/37.74% female gender balance. Table 2 shows the age group distribution across the sample, showing that the female respondents are, overall, older than the male respondents.

Table 2: Age group by gender

	20 – 29	30 - 39	40 - 54	55 and over	Total
Female	15%	31%	49%	5%	100%
Male	34%	30%	33%	4%	100%

Survey respondents reside in 32 countries, with 70.8% of respondents indicating that English is their primary spoken language. Of the remaining primary spoken languages Bangla (5.6%; n=12), Bengali (4.2%; n=9), Hindi (3.2%; n=7) and Kinyarwanda (3.2%; n=7) are the next four most represented. Table 3 shows the 10 countries of residence most represented within the sample.

Table 3: The 10 countries of residence most represented in the survey sample

	%	n=
Rwanda	19.34	41
Bangladesh	16.51	35
India	12.26	26
Fiji	8.02	17
Zambia	5.19	11
Barbados	4.25	9
Kenya	3.30	7
Namibia	3.30	7
Nigeria	3.30	7
Belize	2.36	5
Botswana	2.36	5

5.1 Employment status.

Survey respondents could select multiple options from the range of employment status indicators provided. The majority of survey respondents (79.31%; n=161) indicate that they are full-time

employed, with part-time employment (8.87%; n=18) and full-time study (6.4%; n=13) being the next highest employment status indicators. Interestingly, respondents from Rwanda show a disproportionately low percentage of full employment/self-employment in comparison with residents of other countries. Table 4 compares the employment status results for Rwanda with the mean across all countries, and the results for the four most represented countries, with Rwanda, in the sample.

Table 4: Employment status findings for Rwanda, Bangladesh, India, Fiji and Zambia, compared with the sample mean

	All countries mean %	Rwanda %	Bangladesh %	India %	Fiji %	Zambia %
Full-time employed/self-employed	79.31	14.60	94.30	80.80	94.10	90.90
Part-time employed/self-employed	8.87	26.80	2.90	0	0	9.10
Full-time voluntary work	0.99	0	0	0	0	0
Part-time voluntary work	2.46	9.80	0	0	0	0
Full-time formal student	6.40	19.50	2.90	7.70	0	0
Part-time formal student	1.97	4.90	0	0	0	0
Unwaged and seeking employment	4.43	22	0	3.80	0	0
Unwaged with domestic responsibilities	1.48	4.90	0	3.80	0	0
Disabled and not able to work	0.00	0	0	0	0	0
Retired	0.99	2.40	0	0	0	9.10

5.2 Educational qualifications

Many studies of MOOC learners have found that participants tend to be well-educated (Laurillard, 2016), often to Masters level or above. This is especially common for MOOCs related to education and educational technology. TEL MOOC is no exception, with 37.98% (n=79) of participants being educated to at least Bachelors degree level, 37.5% (n=78) being educated to Masters degree level or equivalent, 6.25% (n=13) to MPhil level, and 7.21% to PhD level (n=15). On balance, the female survey respondents were more highly qualified than their male counterparts.

5.3 Educator characteristics

The collected data indicates that TEL MOOC is performing an important function in training experienced, well-qualified teachers in new TEL techniques. Over half of the survey respondents (52.97%; n=107) have been teaching for over 10 years, 11.39% (n=23) for 7 to 10 years, 11.88% (n=24) for 4 to 6 years, 9.41% (n=19) for 1 to 3 years and 14.36% (n=29) for under 1 year. Nearly all the survey respondents (88.68%; n=188) state that they have a teaching qualification.

Survey respondents were asked to specify their current type of employment role(s). A majority (75.98%; n=155) indicate being employed in a face-to-face teaching role. Results for other types of teaching, and for non-teaching roles are provided in Table 5. 44% of respondents indicate that they have more than one role, and 16% that they have four or more roles.

Table 5: Survey respondents' roles

	% of sample	n=
Face-to-face teaching	75.98	155
Distance education	16.18	33
Online teaching or facilitating	19.61	40
Blended/hybrid teaching (face-to-face and distance or online)	19.12	39
Work-based training	15.69	32
Research	25.98	53
Management/administration	22.06	45
Education support services	21.08	43

A wide range of sectors are represented by the survey respondents, including work-based education and personal tutoring. The majority (49.75%; n=98) were working in a secondary/high school setting at the time of answering the survey, with the higher education/university sector being the second most common (21.83%; n=43). Table 6 gives a full overview.

Table 6: Survey respondents' educational sectors

	% of sample	n=
Secondary /high school	49.75	98
University	21.83	43
College	17.77	35
Elementary	16.75	33
Work-based education	13.71	27
Personal (one-to-one) tutoring	10.15	20
Early education	7.11	14
Vocational school	7.11	14

STEM (science, technology, engineering and mathematics) and ICT subjects are the most common amongst those taught by the TEL MOOC survey participants, as shown in Table 7, which lists the 10 subjects most represented in the sample.

Table 7: Subjects taught by TEL MOOC survey respondents

	% of sample	n=
Science	28.72	54
Mathematics	27.13	51
Computing and Information Science	25.53	48
Education Studies	17.02	32
Languages & Linguistics	16.49	31
Social Science	14.36	27
Economics, Business & Management	11.70	22
Arts	7.98	15
Applied Science, Technology, Engineering	7.98	15
History & Geography	6.91	13

5.4 ICT-related practices and skills

The TEL MOOC evaluation objectives included ascertaining the impact of the course in respect of participants' ICT skills and any barriers they faced in implementing in their own context the skills and knowledge gained from participating in the course. The survey therefore contained questions intended to assess respondents' ICT practices and experience. Over half of respondents (53.55%; n=113) indicate that their primary means of accessing the internet is via an internet-enabled mobile phone (smartphone). Work-based internet access is the next most common (13.74%; n=29). Of those respondents whose primary means of accessing the internet is home-based, 18.01% (n=38) specify that they use a broadband connection and just 2.37% (n=5), located in Bangladesh, Fiji and India, that they are using a dial-up connection as their primary means of internet access.

ICT and TEL skill and experience was assessed using a series of questions asking participants for their perceived level of proficiency across several areas, and another set of questions asking about respondents' online activities over the past year. Figure 3 shows that all survey respondents report at least a basic level of TEL skill. Unsurprisingly, respondents indicate the highest skill levels in using standard computer programs and the lowest in creating digital media.

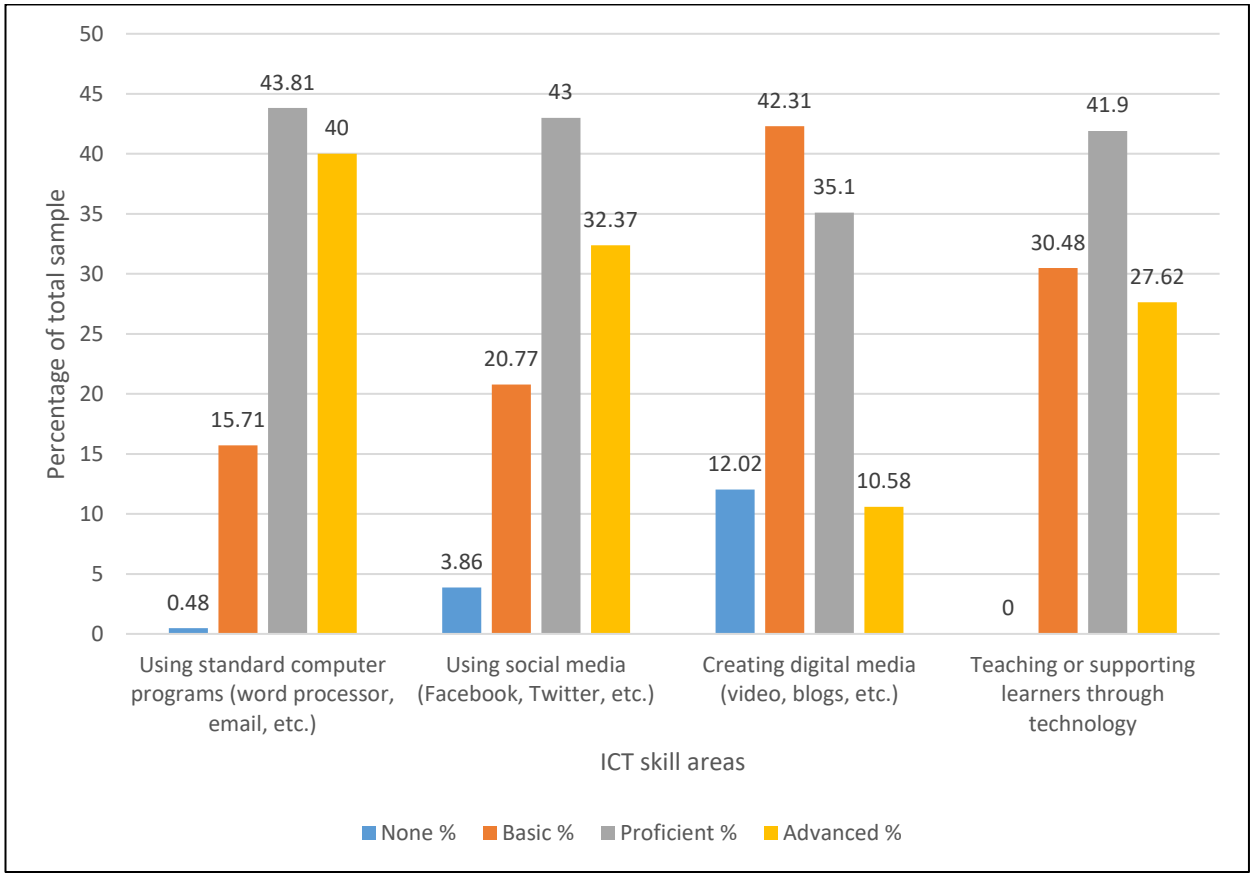

Figure 3: Survey respondents' stated current level of ICT-related skill

Figure 3 shows that online communication-related practices have dominated survey respondents' online activities over the past year. Contributing to a social network is by far the most common activity, followed by discussion forum use, video chat use, and use of a virtual learning environment.

Table 8: 'Which of the following activities have you done in the past year?'

	% of sample	n=
Contributed to a social network (e.g. Facebook, Google+)	68.63	140
Contributed to an Internet-based discussion forum	42.65	87
Participated in a video chat (e.g. Skype/Zoom)	36.76	75
Used a virtual learning environment (VLE) to teach (e.g. Moodle, Blackboard)	36.27	74
Shared an image online (e.g. via Instagram or Flickr)	33.82	69
Uploaded and shared podcasts or other audio/video online (e.g. via YouTube)	27.45	56
Downloaded a podcast (e.g. iTunes) or video	25.00	51
Used a microblogging platform (e.g. Twitter) to share information	21.57	44
Published research or teaching presentations publicly online	19.61	40
Maintained a personal blog or wiki	11.76	24

5.5 Experience in using OER

A key area of focus for TEL MOOC is developing knowledge and skills around the use of OER for teaching and learning. The TEL MOOC impact evaluation was therefore interested in whether participants' open educational practices had changed as a result of their studying the course. Accordingly, two survey questions were used to get a baseline for survey respondents' open educational practices prior to studying TEL MOOC. As Table 9 shows, 79.19% (n=156) of respondents indicate they had experience of using OER for personal reasons before studying TEL MOOC, and 80.71% (n=159) indicate that they had experience of using OER in connection with

teaching others. Fewer people indicate that before studying TEL MOOC they had experience in creating OER (71.93%; n=141), and fewer still that they had experience of sharing and re-sharing adapted OER on Creative Commons licenses. The findings shown in Table 9 are in line with the results reported in Figure 3 in respect of survey respondents' digital media skills.

Table 9: Use of OER prior to studying TEL MOOC

	None - % of sample	n=	**Some** - % of sample	n=	**Extensive** - % of sample	n=	Sample mean
Using OER for personal reasons	20.81	41	65.48	129	13.71	27	1.93
Using OER in connection with teaching others	19.29	38	66.50	131	14.21	28	1.95
Using OER for other work-related reasons	23.23	46	61.11	121	15.66	31	1.92
Using OER for professional development	18.78	37	60.41	119	20.81	41	2.02
Adapting OER to fit my needs	22.56	44	61.03	119	16.41%	32	1.94
Creating OER for work-related purposes	28.06	55	61.22	120	10.71%	21	1.83
Sharing OER on a Creative Commons license	47.72	94	41.62	82	10.66%	21	1.63
Resharing an OER I adapted on a Creative Commons license	46.46	92	43.43	86	10.10%	20	1.64
Adding a resource to an open content repository	46.19	91	43.15	85	10.66%	21	1.64

5.6 Previous online course study experience

Existing studies (e.g. Henderikx et al., 2019) have investigated the link between MOOC participants' previous MOOC study experience and their study outcomes. To allow comparison between this research and the TEL MOOC evaluation, survey respondents were asked both about the number of MOOCs they had participated in prior to TEL MOOC, and the number of non-MOOC online courses (Table 10). Over half of the sample (59.9%; n=124) had not participated in a MOOC prior before their study of TEL MOOC. Survey respondents were more likely to have participated in other types of online course. Table 10 compares the results for MOOC and non-MOOC participation.

Table 10: MOOC and other online course participation before studying TEL MOOC

§	MOOC participation - % of sample	n=	Non-MOOC online course participation - % of sample	n=
None	59.90%	124	41.75%	86
1 - 3	29.95%	62	41.75%	86
4 - 8	5.31%	11	7.77%	16
More than 8	4.83%	10	8.74%	18

5.7 Motivation for studying TEL MOOC

TEL MOOC is intended to have a professional development function for educators, and is promoted as such. It is therefore unsurprising that over 85% of survey respondents (n=175) indicate that developing their professional practice was a motivation for studying the course and 32.35% (n=66) that being able to demonstrate professional development to an employer was a motivation. Of relevance to Impact Pathway 4 (*'TEL MOOC participants' learning is enhanced by their being part of a massive cohort of MOOC learners, functioning as a community of practice…') i*s the fact that half of the respondents suggest that "connecting with like-minded people" was a motivation for study. For just under half of respondents (49.02%; n=100), gaining a certificate was a motivation for study. Again, this is no surprise bearing in mind the fact that many respondents are already very well qualified. Only 16.67% (n=34) of respondents, largely from Bangladesh, Botswana, Grenada and Kenya, state that studying TEL MOOC was supplementing or replacing college or university education. Table 11 gives a full overview of motivations for study across the sample.

Table 11: Motivations for studying TEL MOOC

	% of sample	n=
Developing your professional practice	85.78	175
Interest in the subject	60.78	124
Connecting with like-minded people	50.00	102
Gaining a certificate	49.02	100
Improving your future employment prospects	40.69	83
Enhancing your CV	40.20	82
Gaining confidence or self-esteem	34.31	70
Demonstrating professional development to an employer	32.35	66
Supplementing or replacing college or university education	16.67	34
Leisure or enjoyment	9.80	20

6. The four hypothesized Impact Pathways

As discussed in Section 3, the TEL MOOC ToC, grounded in existing research around the implementation of TEL, the use of OER, and the outcomes of MOOC learners, outlines the hypothesized mechanisms of change involved in four Impact Pathways. The survey results relating to these pathways are reported here.

6.1 Impact pathway 1

"TEL MOOC participants make changes in their own practice as a direct result of their study of the course (and any contributory factors), leading to longer-term impact on learners and on society more generally."

The survey results give extensive evidence of TEL MOOC participants making changes to their own practice as a result of their study of the course (and any contributory factors). The TEL MOOC ToC differentiates between short-term changes in attitudes, in knowledge and skills (Cycle 2 of Wenger et al.'s (2011) Value Creation Framework (VCF)), and in behaviour (Cycle 3 of Wenger et al.'s VCF), as a route to mid-term and long-term impact.

6.1.1 Attitudes

Over 90% of participants working as educators (n=183) report increased confidence in using TEL techniques and in using OER, and increased positivity about the value of TEL and OER. Participants reporting a 'basic' level of TEL skill appear very slightly less confident than the mean for the sample as a whole. The findings for increased positivity about the value of TEL and of OER are similarly impressive; again over 90% of participants report this, and participants reporting a 'basic' level of TEL skill are very slightly more positive than the sample mean. Participants had gained slightly less confidence about creating new courses/course materials, though the sample mean of 87.43% is still conclusive evidence of the impact of TEL MOOC on learners. Further statistical analysis could usefully explore possible correlations with gender, age group, education sector, subject taught and ICT skills and experience (though caution would need to be exerted due to the sample size and the inappropriateness of using parametric statistics). Table 12 gives full details of apparent changes in attitudes connected with studying TEL MOOC.

6.1.2 Knowledge and skills

The survey results for the impact of TEL MOOC on participants' knowledge and skills are also persuasive, with over 90% of survey respondents indicating that studying TEL MOOC has resulted in improved ICT skills and more up-to-date subject knowledge. Again, respondents' views about the impact of TEL MOOC on their course design skills are slightly more measured, but still persuasive at 85.5%. Again, Table 12 gives further details of the survey results.

6.1.3 Behaviour

Survey participants working as educators in some capacity are similarly positive about the impact of TEL MOOC on their practice, with over 90% reporting use of a wider range of technologies to support teaching and learning, and a wider range of multimedia, and just under 90% reporting increased use of OER, broader curriculum coverage, use of a broader range of teaching and learning materials, use of a broader range of teaching and learning methods and increased experimentation with new ways of teaching. Survey respondents reporting a 'basic' level of TEL skill before studying TEL MOOC are notably less positive about the impact of TEL MOOC in terms of their use of a wider range of technologies (78.1%), teaching and learning methods (83.6%), and multimedia (85.5%). The results for this category of learners are still persuasive evidence of impact, however. Table 12 gives a full overview.

6.1.4 Professional development-related behaviour

A sub-category of survey questions around participants' changed behaviour following their study of TEL MOOC focuses on professional development-related activities. As shown in Table 12, educator participants indicate that as a result of studying TEL MOOC they reflect more on the way that they teach (90.71%; n=166), more frequently compare their teaching with that of others (78.14%; n=143), make more use of OER to develop their teaching (87.91%; n=160) and draw more on theory to develop their teaching (70.71%; n=128). 30% of participants state that they have gained a new job as a consequence of studying TEL MOOC and 42.94% that they have been promoted as a consequence. One survey respondent reported that she had received a post-doctoral fellowship in ICT pedagogy and was focusing on OER in teacher education as part of her research.

Table 12: Impact on TEL MOOC educator participants' attitudes, knowledge, skills, and behaviour (green highlighting indicates score above the sample mean)

	Strongly agree %	n=	Agree %	n=	Neither agree nor disagree %	n=	Disagree %	n=	Strongly disagree %	n=	N/A %	n=	Total	Total Strongly Agree & Agree for entire sample %	n=	Total 'Basic' TEL skill level Strongly Agree & Agree %	Difference between sample mean, and respondents with 'basic' TEL skill level
ATTITUDES																	
I am more confident about using technology-enabled learning techniques	40.44	74	53.55	98	2.19	4	1.64	3	1.64	3	0.55	1	183	93.99	172	89.12	-4.87
I am more positive about the value of TEL	38.67	70	55.80	101	2.21	4	0.55	1	2.21	4	0.55	1	181	94.47	171	96.34	1.87
I am more confident about using OER	30.60	56	60.66	111	5.46	10	0.55	1	2.19	4	0.55	1	183	91.26	167	90.97	-0.29
I am more positive about using OER	33.70	61	60.22	109	2.76	5	0.55	1	2.21	4	0.55	1	181	93.92	170	94.61	0.69
I am more confident about creating new courses/course materials	28.96	53	58.47	107	6.56	12	2.19	4	2.19	4	1.64	3	183	87.43	160	87.36	-0.07
KNOWLEDGE & SKILLS																	
I have improved my ICT skills	53.85	98	38.46	70	4.40	8	0.55	1	2.20	4	0.55	1	182	92.31	168	90.97	-1.34
My TEL course design skills have improved	30.60	56	55.19	101	7.65	14	1.09	2	2.73	5	2.73	5	183	85.79	157	85.54	-0.25
I have a more up-to-date knowledge of my subject area	41.99	76	50.83	92	1.66	3	1.66	3	3.31	6	0.55	1	181	92.82	168	96.34	3.52
BEHAVIOUR																	
I make more use of OER in my teaching	37.02	67	51.38	93	5.52	10	0.55	1	3.31	6	2.21	4	181	88.4	160	85.54	-2.86
I have broadened my coverage of the curriculum	34.62	63	53.30	97	7.14	13	0.55	1	2.20	4	2.20	4	182	87.92	160	89.12	1.20
I use a broader range of teaching and learning methods	38.92	72	50.27	93	6.49	12	1.08	2	1.62	3	1.62	3	185	89.19	165	83.66	-5.53
I use a wider range of technologies to support teaching and learning	40.11	73	50.00	91	4.95	9	1.65	3	2.75	5	0.55	1	182	90.11	164	78.10	-12.01
I experiment more with new ways of teaching	36.46	66	53.04	96	5.52	10	1.10	2	2.21	4	1.66	3	181	89.5	162	89.12	-0.38
I make use of a wider range of multimedia	36.87	66	55.31	99	4.47	8	1.12	2	2.23	4	0.00	0	179	92.18	165	85.54	-6.64
I make more use of culturally diverse resources	25.27	46	54.95	100	12.09	22	3.30	6	2.75	5	1.65	3	182	80.22	146	78.10	-2.12
PROFESSIONAL DEVELOPMENT-RELATED BEHAVIOUR																	
I reflect more on the way that I teach	32.79	60	57.92	106	6.01	11	0.55	1	1.64	3	1.09	2	183	90.71	166	87.36	-3.35
I more frequently compare my own teaching with that of others	23.50	43	54.64	100	14.21	26	3.28	6	2.19	4	2.19	4	183	78.14	143	70.97	-7.17
I use/make more use of OER to develop my teaching	32.42	59	55.49	101	7.69	14	1.10	2	2.20	4	1.10	2	182	87.91	160	80.00	-7.91
I draw more on theory when developing my teaching	18.78	34	51.93	94	17.13	31	5.52	10	2.76	5	3.87	7	181	70.71	128	69.17	-1.54

6.1.5 Behaviour related to OER use

20.77% (n=38) of survey respondents working as educators had not previously used OER for teaching. The responses of this sub-group offer further evidence of the impact of TEL MOOC on educators' open educational practices. 71.1% (n=27) confirm that they now make more use of OER in their teaching, 73.7% (n=28) that they are more confident about using OER, 79% (n=30) that they are more positive about using OER and 65.8% (n=25) that they make more use of OER to develop their teaching. However, Table 13 shows that, compared with the sample as a whole (which includes survey respondents who were already experienced in OER use prior to studying TEL MOOC), respondents who had not used OER for teaching prior to studying TEL MOOC show less evidence of various aspects of OER use. Teaching preparation, gaining new ideas, broadening the range of teaching methods used, staying up-to-date in a subject area, and engaging learners more fully in a subject are the most popular reasons for using OER amongst this subset of survey respondents.

Table 13: Reasons for OER use amongst survey respondents who had not used OER for teaching prior to studying the course

"As a result of studying TEL MOOC I make more use of OER…"	% of educator respondents who had not previously used OER for teaching	n=	% of overall sample
To prepare for my teaching/training	52.61	20	78.86
To get new ideas and inspiration.	44.72	16	70.86
To supplement my existing lessons or coursework	50.00	19	60.57
As 'assets' (e.g. images or text extracts) within a classroom lesson	21.11	8	38.86
To give to learners as compulsory self-study materials	23.70	9	36.00
To give to learners as optional self-study materials	21.11	8	41.14
To provide e-learning materials to online learners.	26.34	10	44.00
To compare them with my own teaching materials in order to assess the quality of my materials	15.86	6	32.57
To broaden the range of my teaching methods	36.81	14	53.14
To broaden the range of resources available to my learners	23.70	9	50.29
To make my teaching more culturally responsive	15.86	6	37.71
To enhance my professional development	36.81	14	62.29
To stay up-to-date in a subject or topic area	39.54	15	50.86
To learn about a new topic	28.99	11	42.86
To engage my students more fully in a topic area	31.62	12	45.71
To interest hard-to-engage learners	21.11	8	39.43

6.1.6 Longer term impact on students

In addition to offering a conclusive indication of TEL MOOC's impact on participants' practice as educators the survey data also gives evidence of TEL MOOC's contribution to longer term positive impact on students being taught by those educators, as summarized in Table 14, and a component of Impact Pathway 1 in the TEL MOOC ToC. Over 80% of educator survey respondents indicated that their studying TEL MOOC had led to their learners' increased participation in class discussions, increased interest in the taught subjects, increased satisfaction with the learning experience, increased confidence, increased engagement with lesson content, increased collaboration, increased enthusiasm for future studies, and increased likelihood of completing their studies (the latter being very important where retention can be a challenge). These results are of particular interest in respect of Sustainable Development Goal 4 – quality education – as is the fact that 86.1% (n=130) of educator participants suggested they were better able to accommodate diverse learners' needs as a result of studying TEL MOOC, and 77.8% (n=115) that their learners were more likely to attend school or college as a result of those educators' study of TEL MOOC. One participant's comment expresses the spirit of the responses as a whole: "My learners are now highly collaborated and are now confident for their good future".

Table 14: Perceived impact of TEL MOOC on educator participants' learners

Studying TEL MOOC has led to…	Strongly agree %	n=	Agree %	n=	Neither agree nor disagree %	n=	Disagree %	n=	Strongly disagree %	n=		Strongly Agree/ Agree total %	n=
My learners' increased participation in class discussions	36.13	56	46.45	72	16.13	25	0.65	1	0.65	1		82.58	128
My learners' increased interest in the subjects taught	36.13	56	50.97	79	12.26	19	0.00	0	0.65	1		87.10	135
My learners' increased satisfaction with the learning experience	30.07	46	54.90	84	14.38	22	0.00	0	0.65	1		84.97	130
My learners' grades improving	26.32	40	50.00	76	23.03	35	0.00	0	0.66	1		76.32	116
My learners' increased confidence	27.15	41	57.62	87	14.57	22	0.00	0	0.66	1		84.77	128
My learners' increased independence and self-reliance	25.97	40	51.30	79	18.83	29	3.90	6	0.00	0		77.27	119
My being better able to accommodate diverse learners' needs	22.52	34	63.58	96	12.58	19	1.32	2	0.00	0		86.10	130
My learners' increased engagement with lesson content	26.62	41	59.74	92	12.34	19	0.65	1	0.65	1		86.36	133
My learners' increased experimentation with new ways of learning	23.03	35	55.92	85	19.08	29	1.32	2	0.66	1		78.95	120
My learners' increased collaboration and/or peer-support	24.34	37	59.87	91	15.79	24	0.00	0	0.00	0		84.21	128
My learners' increased enthusiasm for future study	26.67	40	56.67	85	16.00	24	0.67	1	0.00	0		83.34	125
My learners being more likely to complete their studies	25.17	38	55.63	84	17.88	27	0.66	1	0.66	1		80.80	122
My learners being more likely to attend school/college	22.15	33	55.03	82	20.81	31	0.67	1	1.34	2		77.18	115
My learners sharing resources with others more often	20.39	31	55.26	84	23.03	35	1.32	2	0.00	0		75.65	115
My learners being more likely to use/create/share OER	18.67	28	50.00	75	26.67	40	2.67	4	2.00	3		68.67	103

6.2 Impact pathway 2

"TEL MOOC participants share knowledge, skills and resources with colleagues, who are also influenced by participants' change in practice, leading to practice changes for colleagues and subsequent longer-term impact on learners and society.

The survey responses and interview data give support for the long term impact of TEL MOOC being attributable, at least in part, to the three categories of activity identified in the initial draft theory of change – TEL MOOC as a facilitated course, as a network (following Downes, 2013), and as downloadable and shareable open resources. All are relevant for Impact Pathway 2, which hypothesises a multiplier effect whereby TEL MOOC participants share knowledge, skills and resources with their colleagues, influencing those colleagues' practice, with consequent longer-term impact on learners.

68.15% (n=107) of educator participants indicated that they had shared the openly licensed TEL MOOC materials with colleagues. One survey respondent, working in work-based training and educational support, commented that when he explains new TEL-related concepts to his colleagues he sometimes provides them with a reference to TEL MOOC. The TEL MOOC Activity Plans were repeatedly mentioned in open comments as being a useful focus point for participants' discussion of TEL implementation with their colleagues. The hypothesised impact of TEL MOOC in contributing to increased collaboration between participants and their colleagues is supported by 84.7% (n=155) of survey respondents while more specific evidence of TEL MOOC's impact in increasing participants' sharing practices around OER (89.10%; n=139) and around TEL pedagogies (90%; n=144) is also found in the survey data.

The TEL MOOC ToC identifies changes in course participants' colleagues' practices as mid-term impact. The survey responses are a little more conservative on this topic, than they are in respect of participants' own change of behaviour. Even so, the responses do support a hypothesis suggesting a multiplier effect resulting from collaboration leading to increased knowledge and skills, and to changes in attitudes and behaviour (including behaviour related to professional development). Table 15 gives full details.

Table 15: Perceived impact of TEL MOOC on participants' colleagues

	Strongly agree %	n=	Agree %	n=	Neither agree nor disagree %	n=	Disagree %	n=	Strongly disagree %	n=		Total Strongly Agree/ Agree %	n=
TEL MOOC PARTICIPANTS' BEHAVIOUR													
As a result of my studying TEL MOOC…													
I am more likely to openly share resources I've created	30.39	55	50.28	91	11.05	20	1.66	3	2.21	4		80.67	146
I collaborate more with colleagues at the institution in which I work	39.34	72	45.36	83	7.65	14	2.19	4	2.19	4		84.70	155
Studying TEL MOOC has led to…													
My sharing the openly licensed TEL MOOC materials with colleagues	18.47	29	49.68	78	26.11	41	4.46	7	1.27	2		68.15	107
My sharing information about TEL pedagogies with colleagues	37.50	60	52.50	84	7.50	12	2.50	4	0.00	0		90.00	144
My sharing information about OER with colleagues	30.13	47	58.97	92	8.97	14	1.92	3	0.00	0		89.10	139
COLLEAGUES' ATTITUDES *(Studying TEL MOOC has led to…)*													
My colleagues being more confident about using technology-enabled learning techniques	20.51	32	43.59	68	25.64	40	9.62	15	0.64	1		64.10	100
Changes in colleagues' attitudes towards the implementation of/innovation in TEL	14.01	22	52.23	82	25.48	40	7.01	11	1.27	2		66.24	104
My colleagues being more confident about creating new courses/learning materials.	17.31	27	48.72	76	25.64	40	7.69	12	0.64	1		66.03	103
COLLEAGUES' BEHAVIOUR *(Studying TEL MOOC has led to…)*													
My colleagues making more use of OER in their teaching	18.24	29	49.06	78	22.01	35	8.81	14	1.89	3		67.30	107
My colleagues using a broader range of teaching and learning methods	15.72	25	52.83	84	23.27	37	6.92	11	1.26	2		68.55	109
My colleagues using a wider range of technologies for teaching and learning	21.02	33	50.32	79	19.11	30	8.92	14	0.64	1		71.34	112
My colleagues using a wider range of multimedia resources	22.15	35	50.63	80	19.62	31	6.96	11	0.63	1		72.78	115
My colleagues making more use of culturally diverse resources	16.56	26	45.22	71	26.75	42	9.55	15	1.91	3		61.78	97
My colleagues being more likely to openly share resources they've created.	18.59	29	40.38	63	30.77	48	8.97	14	1.28	2		58.97	92
COLLEAGUES' PROFESSIONAL DEVELOPMENT-RELATED BEHAVIOUR *(Studying TEL MOOC has led to…)*													
My colleagues reflecting more on the way they teach	21.15	33	53.85	84	17.95	28	6.41	10	0.64	1		75.00	117
My colleagues more frequently comparing their teaching with that of others	17.20	27	47.77	75	28.66	45	5.73	9	0.64	1		64.97	102

6.3 Impact pathway 3

TEL MOOC participants influence institution leaders, leading to institution-wide policy/strategy change, and long-term impact on learners and society.

The TEL MOOC ToC identifies influence on institution leaders and managers as a short-term impact and institutional policy changes as a medium term impact of the course. The survey findings indicate that TEL MOOC is indeed contributing to attitude and policy changes at institutional leadership level, and to cost savings, the latter reported by 56.41% (n=118) of survey respondents. 69.4% (n=127) indicated that they have influenced managers/institution leaders in respect of the implementation of TEL and 66.67% (n=122) in respect of the use of OER. 56.77% (n=88) of TEL MOOC participants surveyed report changes in managers' attitudes resulting from those participants' study of the course, and 54.2% (n=84) report institutional policy changes. However, several survey respondents reported resistance to change at institutional level and the influence of external factors such as resource, funding and curriculum constraints. This is discussed in more detail in Section 6.6 below and in the case study reports in Section 7.

6.4 Impact pathway 4

"TEL MOOC participants' learning is enhanced by their being part of a massive cohort of MOOC learners, functioning as a community of practice (see Downes, 2013; Wenger, 1998). They gain networking experience and skills, and make connections that last beyond their study of the course and are a source of peer support as they experiment with the application of their newly gained skills and knowledge to their own practice."

Following Downes's (2013) assertion that MOOCs should be evaluated for their function as networks, above any other evaluation criteria, Impact Pathway 4 is grounded in a hypothesis that TEL MOOC participants' learning is enhanced by their being part of a massive cohort, by gaining networking skills and experience, and by making long-lasting connections with like-minded peers. The TEL MOOC survey data offers evidence of TEL MOOC's impact on the development of networking skills and experience, with 76.37% of survey respondents (n=139) suggesting that as a result of studying TEL MOOC they network more with peers outside the institution in which they work. However, only 46.47% (n=79) of respondents suggested that networking with other TEL MOOC participants for peer support and information-sharing purposes after the course had ended had influenced changes to their practice.

6.5 Contributory factors

As discussed in Section 3 above, The TEL MOOC evaluation combines a "contribution-oriented" (Stern et al., 2012, p. 38) approach investigating "the contribution an intervention is making to outcomes and wider impacts" (Gates and Dyson, 2017, p. 31), rather than attributing apparent causality solely to participants' study of TEL MOOC. The use of a ToC approach as the basis for the TEL MOOC long-term impact evaluation study aligns well with this approach in supporting the investigation of additional factors contributing to impact identified by survey respondents.

The TEL MOOC ToC features three clusters of 'contributory factors' – Cluster A making a potential contribution to the impact of TEL MOOC on participants themselves in terms of changes in their attitudes and behaviour, Cluster B (identical to Cluster A) making a potential contribution to the impact on TEL MOOC participants' colleagues' attitudes and behaviour, and on institutional/policy change, and Cluster C making a potential contribution to the longer-term impact on stakeholders other than the course participants and their colleagues.

The TEL MOOC survey featured several questions covering possible contributory factors to changes in TEL MOOC participants' attitudes and behaviour, beyond their study of the course itself. Table 16 summarises the collected data, showing that the need to meet performance targets is indicated as the strongest driver for survey participants' changed practice (67%; n=114), followed by the support of colleagues and their willingness to try new teaching techniques (48.24%; n=82). As already mentioned, nearly half of the survey respondents suggested that networking with other TEL MOOC participants had influenced changes in their practice and 42.35% (n=72) that support from peers online had performed this function. Institutional policies/strategies, government policies and the availability of funding to support TEL innovation are identified

as contributory factors by some survey respondents but, as discussed in Section 6.6, are more commonly identified as barriers to innovation and TEL implementation.

Table 16: "Which of the following factors, if any, have influenced any changes in your practice since studying TEL MOOC?"

	% of sample selecting this factor	n=
A need to meet performance targets connected with my job	67.06	114
Colleagues' support and/or willingness to collaborate in trying new teaching techniques	48.24	82
Networking with other TEL MOOC participants after the course had ended (e.g. for peer support/sharing ideas)	46.47	79
Support from peers online (e.g. via social networks and forums)	42.35	72
Institutional policies or strategies driving the implementation of TEL or of OER	41.76	71
Government policies supporting the implementation of TEL or of OER	37.06	63
The availability of funding to support TEL innovation	30.00	51
A desire to gain promotion	20.00	34
Financial incentives for implementing TEL pedagogies	18.82	32

6.5.1 Other professional development contributing to impact

For many survey participants, TEL MOOC has not been the only form of professional development activity informing their practice in terms of changes in attitude and behaviour. In line with the principles of contributions analysis, survey respondents were asked about other ways in which they had developed their practice since studying TEL MOOC. The responses are reported in Table 17, showing that around two thirds of survey respondents had developed their professional practice in at least one other way. It is therefore reasonable to assume that, for these survey respondents, any changes in attitudes and behaviour can be attributed at least in part to the identified non-TEL MOOC professional development activities. However, it is also reasonable to assume that the experience of participating in TEL MOOC has, in itself, led to participants subsequently studying other MOOCs and online courses – a further aspect of TEL MOOC's impact.

Table 17: "In which of the following ways, if any, have you developed your professional practice since completing your study of TEL MOOC?"

In which of the following ways, if any, have you developed your professional practice since completing your study of TEL MOOC?	**%**	**N=**
Discussion with others via social networking or microblogging (e.g. via Facebook, Twitter, Google+, WhatsApp)	66.67	118
Use of OER	64.41	114
Studying one or more online courses	55.37	98
Discussion with others in online forums	50.85	90
Independent study using the internet to source information	50.85	90
Discussion with others in person	50.28	89
Studying one or more MOOCs	48.02	85
Studying one or more face-to-face courses	30.51	54

6.6 Assumptions and risks: Barriers to impact in diverse contexts

Section 3.3 above explains that TEL MOOC evaluation's approach to causality involves considering the significance of multiple contextual factors in both enabling and inhibiting impact on participants and other stakeholders in specific contexts – factors that are represented as 'assumptions' in the draft ToC, and which have the potential to be risks should those assumptions not be realised. The assumptions in the draft ToC are informed by studies addressing the influence of context on MOOCs' short-term and longer-term impact and on the implementation of TEL, as outlined in earlier.

As Table 18 shows, technology-related barriers to impact are most common experienced by survey respondents, along with lack of time – a finding in line with the literature about barriers to TEL implementation, as discussed in Section 3.3.1.

Table 18: Factors limiting impact for TEL MOOC participants

	%	n=
Lack of ICT equipment	51.76	88
Lack of funding to purchase new technology	50.59	86
Lack of time to experiment	48.24	82
Slow or unreliable internet connection	47.65	81
Student lack of skill in using ICT	38.82	66
Lack of IT support	37.06	63
Infrastructure problems (e.g. power cuts)	37.06	63
Dated software	30.59	52
Lack of support from teaching colleagues	24.71	42
Institutional policies and priorities	23.53	40
Lack of support from managers	21.76	37
Curriculum constraints limiting the potential for experimentation with new teaching methods	21.76%	37
Dated hardware	20.59%	35
Unavailability of specific websites/platforms in my country	17.65%	30
Government policies and priorities	14.71%	25
Student disinterest in TEL techniques	13.53%	23
My own lack of skill	12.94%	22
Personal issues (e.g. caring responsibilities, illness)	12.35%	21
Not knowing how to evaluate my practice	10.00%	17
Change of job role	8.24%	14

Student and institution lack of ICT equipment was repeatedly mentioned in the open comments section of the survey. One survey respondent outlines the challenges they've faced in implementing TEL and some of the strategies they've adopted in an attempt to address those challenges:

> Given the economy and the poverty levels of Botswana, some of the Open and distance learning (ODL) learners (30%) are poor and cannot afford a smart phone. Also their locations have limited to no internet connectivity. Such students though they could benefit much on TEL, they are disadvantaged. However, in one such location, I made an effort allow the community elders to avail a community hall where wireless could be connected for such students to access internet for learning at their own time. The efforts failed due to lack of interest from the organization on the basis of lack of funds. I am still looking for a sponsor who could be willing to fund the initiative at least for period of five years at a cost of about $100.00 per month to show case the potential of TEL.

Another survey respondent mentioned "too much reliance on teacher to provide as many can not afford laptops, smart phones" while a further respondent commented: "I have not been able to use technology because for the group of students I engage with, there is no internet access and also most students do not have android phones or tablets", a point repeated in other open comments.

21.76% of respondents (n=37) mentioned "lack of support from managers" and 14.71% (n=25) indicated that "government priorities and policies" had limited the impact of TEL MOOC on their practice. A respondent from Fiji touched on both when reporting:

> No recognition of professional development in Fiji. Lack of support from heads of schools who are underqualified but lead schools whereas qualified people are not recognised. E.g. my school head has just a teaching certificate and a novice in tech while I have post grad qualification but still teach in classroom.
>
> In Fiji very little opportunities are available for technology enabled learning…Schools do not provide resources to deal with it. Computer labs lack internet connectivity. Used for admin work only.
>
> Proposed an idea of using interactive boards in classroom but idea rejected due to lack of funds.

6.6.1 Barriers to impact relating to open educational practices

In addition to collecting wide-ranging data about barriers to TEL implication, the TEL MOOC survey also included more specific questions about factors that may have limited respondents' use of OER. Many of these questions are drawn from the OER Hub open survey question bank[5]. Table 19 shows that difficulties in finding suitable OER is the most common obstacle to their use, along with lack of time (echoing the findings reported in Section 6.6 above) and findings reported by the OER Hub (e.g. de los Arcos et al, 2014).

Table 19: Factors affecting TEL MOOC participants' use of OER since studying the course

	% of sample	n=
Difficulty in finding suitable OER in my subject area	37.34	59
Knowing where to find OER	34.81	55
Not having enough time to look for suitable resources	34.81	55
Difficulty in finding suitably high quality OER	34.18	54
Technology problems when downloading resources	33.54	53
Difficulty in finding up-to-date OER	32.91	52
Difficulty in finding resources relevant to my local context	32.28	51
Lacking institutional support for my use of OER	27.85	44
Difficulty in finding resources appropriate to the sector/level in which I teach	25.95	41
Not having enough time/opportunities to experiment with using OER in the classroom	23.42	37
Not having connections with OER-using peers who could be a source of support	21.52	34
Not knowing whether I have permission to use, change or modify resources	20.25	32
Work colleagues/managers not being positive about the use of open educational resources	19.62	31
Resources not being aligned with professional standards or regulation	17.72	28
Difficulty in finding OER in a suitable language	16.46	26
Not being skilled enough to edit resources to suit my own needs/context	16.46	26
Not knowing how to use OER in the classroom	13.29	21

6.6.2 Strategies for addressing factors limiting the implementation of TEL

Survey respondents were asked about strategies they had tried in order to address the challenges they faced in implementing knowledge and skills gained from TEL MOOC in their own setting. Lack of technology continued to be a theme, with several respondents reporting that they had bought computers and smartphones themselves to compensate for a lack of equipment in their own institution, and amongst their students, and others that they were using their personal data allowance for work purposes, to allow the implementation of TEL. Improvisation of technologies was also mentioned. Respondents also mentioned seeking faster internet connections than those available in their own institution and several respondents mentioned reallocating their workload in order to gain the time to experiment. In respect of the latter, participants' generosity is very much

[5] https://docs.google.com/spreadsheets/d/1fL_yf-O70ZjvH67Ue8LlfidjEXwtDQ5T0TBe-Z1GYaI/edit#gid=0

in evidence in their responses. Not only are educators using their own money to buy data, hardware and software; they are also giving generously of their own time in order to implement the skills they've gained through studying TEL MOOC.

These are some of the comments made in response to a question about strategies being employed to address barriers to TEL implementation and experimentation:

- Basically had to do a lot at home sacrificing time that belongs to my children
- Work overtime
- I used to download my resources from home as there is no internet connection at school
- Better time management, planning in advance, use of weekends
- Study at midnight
- During my break time and free time, I use to occupy my students with my OER.
- Only patience, I was ready to sacrifice my time for this course

Peer support from teaching colleagues and managers was repeatedly mentioned as a strategy for addressing implementation challenges and several participants mentioned their conducting additional research in the desire to find out how they might navigate barriers to TEL implementation.

7. The case studies

In addition to the data collected via the survey, qualitative interviews via Skype and WhatsApp were used to build case studies of five TEL MOOC participants in order to better understand the impact of TEL MOOC in specific contexts, and the factors contributing to and/or limiting that impact. As discussed in Section 4.2.4, a theoretical sampling strategy (Warren, 2001, p. 87) was employed to select case study participants on the basis of their demographic characteristics (in order to allow investigation of diverse contexts and teaching settings and representation across gender and age group), and where their survey responses indicated that further exploration of those participants' experiences would support evaluation of the four Impact Pathways appearing in the TEL MOOC ToC.

7.1 Case Study 1

Name	Mamtaz Rokshana Akhter (participant wishes her own name to be used)
Gender	Female
Age group	40 - 54
Country of residence	Bangladesh
Primary spoken language	Bengali
Employment status	Full-time employed
Employment type	Face-to-face teaching
Sector	Secondary school
Subjects	Literature; accounting, finance & banking
Teaching experience	Over 10 years
Primary internet access means	At home using broadband

Mamtaz teaches at a secondary school in Bangladesh. She was very pleased to be asked to discuss how participating in TEL MOOC has affected her practice, and eager to share some of the digital resources she has created since studying the course.

7.1.1 Skills and experience profile

A key component of the TEL MOOC impact evaluation is consideration of factors that may affect the complex mechanisms of change being investigated in the study. To allow an initial overview of case study participants' skills and experience, and an easy visual comparison between case studies, each participant was profiled on several aspects of their background covered in the survey questions. A weighted mean score was given to relevant survey question responses to allow production of a radar diagram (Figure 4) for each participant. A numerical axis has not been included in this radar diagram as very disparate characteristics, with disparate response scales, are featured on the diagram and comparison between case study participants, rather than between diagram elements, is intended.

Figure 4 shows that Mamtaz is well qualified, has extensive teaching and OER use experience, is very skilled in ICT use, had taken several MOOCs prior to studying TEL MOOC and had studied even more online courses. The 'online practice' component of Figure 4 is an aggregate of the score given for questions about participants' experience of microblogging (e.g. Twitter), personal blogging or wiki use, image sharing, uploading and downloading podcasts, discussion forum and video chat use, social networking, VLE use and publishing research online. Mamtaz has a fairly low aggregate score for this component.

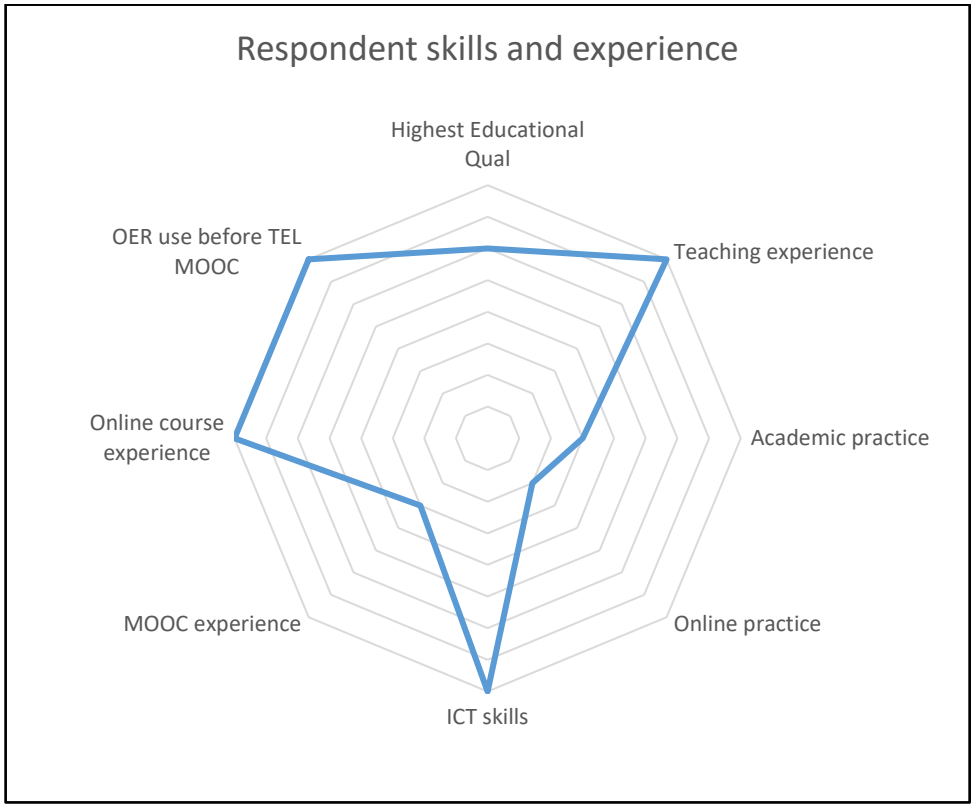

Figure 4: Case study 1 skills and experience profile

A further radar diagram (see Figure 5) was produced for each case study showing the weighted mean score for the apparent impact of TEL MOOC on participants' practice, professional development, collaboration and OER use, derived from the Likert scale items in Table 12 (scored 1 for 'Strongly Disagree' through to 5 for 'Strongly Agree'). Here, a numerical axis *is* included, as elements with identical response scales are being compared. Figure 5 shows that for Mamtaz TEL MOOC had a high level of impact on collaboration and teaching, slightly less impact on her use of open educational practices (as Mamtaz was already using OER before studying TEL MOOC), and some impact on her professional development.

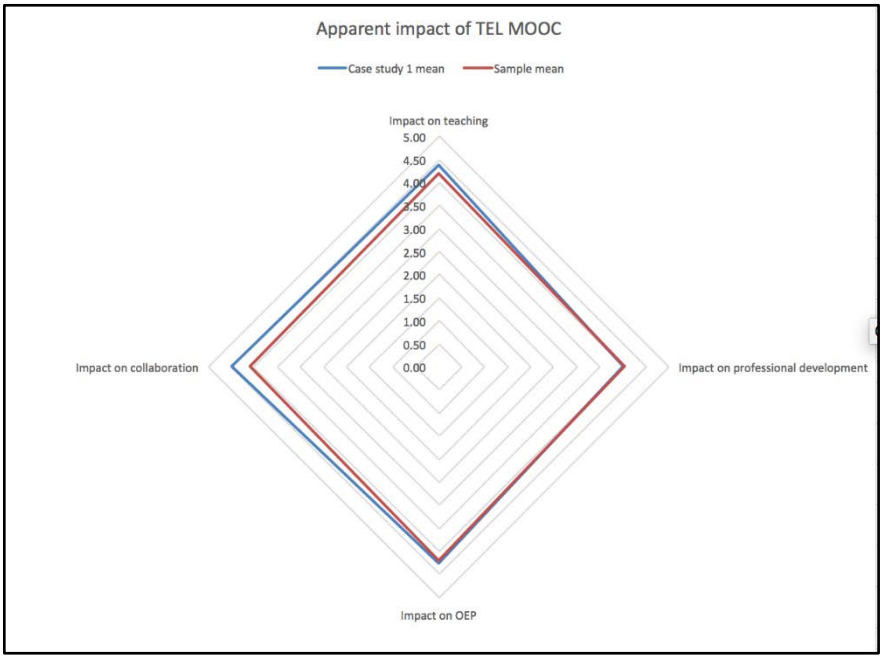

Figure 5: Apparent impact of TEL MOOC on Case Study 1

A more nuanced picture of the impact of TEL MOOC on Mamtaz, and of the context-specific factors limiting/enabling impact in her setting, was gained from discussion with her during a qualitative Skype-based interview.

7.1.2 Impact Pathway 1: Impact on participants' practice and longer-term impact on student outcomes

Mamtaz was clear about the fact that studying TEL MOOC had a strong and wide-ranging impact on her own practice as a secondary school teacher. She explained:

> The impact of TEL MOOC on my teaching methodology goes beyond educator-centric education to arousing students in a global way of learning. In keeping with that goal, I occasionally set up audio sound system in my classroom. For the sustainability of students' learning, I am creating subject -based digital content and applying it in the classroom. I believe this will increase the effectiveness of the student's learning ability.

Mamtaz explained that since studying TEL MOOC she has been experimenting with Camtasia software and with PowerPoint. She shared examples of PowerPoint presentations that her students have found interesting, and which she has created in order to apply the knowledge gained from studying TEL MOOC. Mamtaz explained that she creates many digital resources and, since studying TEL MOOC, has been sharing them openly via YouTube (where she has her own channel[6]), Facebook[7] and the Bangladesh Government website for teachers[8].

In her survey responses Mamtaz expressed her conviction that her study of TEL MOOC has had a positive impact on the students that she teaches, for example in respect of their increased satisfaction, participation, interest, improved grades, their increased engagement with lesson content and experimentation with new ways of learning, their increased collaboration and resource-sharing, and their increased likelihood of attending school. Discussing this in more depth during the interview she expanded on her view:

[6] https://www.youtube.com/watch?v=nAjz4eRcgvA
[7] https://www.facebook.com/mamtajrokshana.akter
[8] https://www.teachers.gov.bd/users/mamtazrokshana

> The area where I work is a rural area. Most people are illiterate and live below the poverty line. After a lot of hurdles I have been trying and seeing the results of students getting better results than ever before. Student attendance in classrooms is higher than ever. My belief is that in the future my students will use TEL materials with interest, such as those on my YouTube channel, and will continue to benefit from them.

Discussing some of the factors that make implementing TEL techniques in her secondary school classroom a challenge, Mamtaz notes the impact of social norms in rural Bangladesh regarding children's use of the internet:

> The society here is highly conservative. Due to vulgar material and ads abounding on the internet, most children are restricted from it. Even use of it in class under a teacher's guidance is not acceptable to some parents. Even the use of the site designed for students by the government, Kishore Batayan[9], in the Bengali language, is frowned upon. In this case, there is a dearth of support from their guardians and local administration. However, there is more tolerance in the city than in the rural areas. That is why many students there are ahead of our students. Also, I live in a Muslim community where there are more restrictions. For example, girls are faced with a different situation from boys and are more restricted.

7.1.3 Impact Pathway 2: Changes in colleagues' practice

In her survey responses, Mamtaz had indicated that she collaborates more with colleagues as a result of studying TEL MOOC, and that TEL MOOC has had a positive impact on her colleagues – aspects of impact explored in more depth during the interview in respect of Impact Pathways 2 and 4. Mamtaz explained that before studying the course she was already a proficient social media user and, on completing TEL MOOC, she used social media to share her experiences with colleagues within her own institution in addition to those further afield. However, her colleagues' reaction was mixed, Mamtaz explains:

> When I first completed the TEL MOOC Course and shared it on social media in 2017 some colleagues from other institutions in my country expressed interest in it. As a result, when the TEL MOOC course resumed in 2018, colleagues from other institutes completed it with my assistance. It is good to say here that my dear colleagues in my own institution have not shown any interest at all after I shared it with them. However, some guest colleagues expressed great interest in the course. I am thinking that since you are resuming the TEL MOOC course from September 22nd in 2019 I will invite them to take part in it. I would advise them to apply the knowledge gained from the course to the learning process. I am also continuing to try with my permanent teachers. I think that is my duty.

Mamtaz suggested that the impact of TEL MOOC on colleagues from outside her own institution included their gaining confidence in using TEL techniques and in creating new courses and learning materials. Asked why colleagues at her own institution have not appeared as interested in TEL MOOC as have peers elsewhere, Mamtaz comments that this appears due to a combination of deeply-held pedagogical habits, and institution-related limitations, highlighting the effect of institution-specific factors in enabling or limiting change:

> As I've said, I work in a rural area. A large percentage of the community is illiterate, so it is very difficult to explain global education to them. If the administration had real accountability, all the teachers would have been made accustomed to technology as their own responsibility and used it in teaching. Technology-based learning requires acquiring a skill and practicing it, which is why teachers in the rural area are reluctant to accept it.
>
> Colleagues from my institution have not developed any interest in technical education at all since they are too accustomed to conventional methods of education. To change this trend, I am trying to explain to them the Activity Plan of TEL MOOC so that they can make it easy and apply it to the teaching and learning in the classroom. In fact, many of my colleagues are reluctant to do technology based work for many limitations. Here, 'limitations' are meant to refer to many institutional problems. If constraints can

[9] http://konnect.edu.bd

> be overcome, it may be possible to increase their confidence in the creation of new Internet-based courses and learning materials

Mamtaz's work with her colleagues, based around the TEL MOOC Activity Plan, shows the value of that aspect of the course in providing a focus for participants when explaining TEL techniques with their peers, including their application in specific settings. Her approach to supporting peers through their study of TEL MOOC also shows how the course impact could be further increased through this form of informal mentoring, whereby previous participants support new participants in their studies.

Mamtaz's experiences highlight the multiplicity of factors that can limit and enable impact including, in her context, the dominance of OER produced only in the English language, which are inaccessible and appear irrelevant to her Bangladeshi colleagues:

> There is a great obstacle to learning the English language here. Most teachers and students feel limited in this subject, so they show disrespect for technology based learning. Their cooperation is rarely available, so I mostly work on my own without the help of colleagues. Moreover, I have to take extra workloads and pressure. However, with appropriate cooperation, I will endeavor to extend the influence of TEL MOOC to all institutions of Bangladesh.

7.1.4 Impact Pathway 3: influencing managers and institution leaders

The initial draft ToC hypothesizes Impact Pathway 3 as involving TEL MOOC participants influencing leaders in their own institutions, resulting in policy change in respect of TEL implementation. However, for Mamtaz the impact of her TEL MOOC participation has been much wider-ranging, extending to external bodies in Bangladesh. She explains that:

> When I completed the TEL MOOC Course and promoted it through social media the Ministry of Information, Bangladesh recruited me as an ICT4E District Ambassador. I want teachers to experience technology and encourage them to apply it in the classroom. Apart from that, I have been working on other web sites including TEL MOOC, in addition to teaching to enhance my professional skills. I am now a British Council School Ambassador, part of the Microsoft Educator Community, Canvas Network and Future Learn communities.

Continuing to discuss ways in which she has influenced institution leaders, Mamtaz comments:

> An ICT4E District Ambassador has to work with the institution heads for technology-based learning in local schools. My institution does not receive as much support from the head of the organization for its various limitations. As the Government of Bangladesh is putting more emphasis on teaching teachers about technology-based learning, I have gained hope. Against hundreds of adversities, I continue to try to advocate the same message. It is encouraging to see TEL MOOC is also spreading the word on various issues with the institution heads.

Mamtaz's response echoes a point made by various survey respondents – that institution leaders have considerable power to support the implementation of TEL or, alternatively, to block pedagogical innovation. Mamtaz explains that unhelpful and unknowledgeable managers and leaders, combined with a lack of technology, can make it difficult to implement TEL pedagogies, and that in such circumstances determination and perseverance is essential, as individuals can still do a lot without institutional support:

> I have to face many problems in applying the knowledge and skills acquired from TEL MOOC in my institutions properly. The main problem is the limitation of technical equipment in my organization. If the technical facilities were as needed in my organization, I could spread the knowledge acquired at TEL MOOC to my own establishment and to all other institutions in any effort. I think the main reason for teachers' apathy is lack of internet connection and lack of technology based equipment at the institute. Also, most teachers are not adept at the use of technology. Even the head of the institution is limited in his technical knowledge. The school governing council and the local administration are apathetic about technical education. Colleagues do not always have a positive attitude. There is a great

> lack of encouragement overall. Also, the proportion of students is higher in student-teacher ratio. However, my students have interest plenty, so I try to do as much as I can by myself. I do my level best and will continue to do so.

7.1.5 Impact Pathway 4: Development and influence through networking

Following her study of TEL MOOC Mamtaz has joined a number of global education communities that allow her to widen the impact of the course by sharing her knowledge and passion for TEL – an extension of the hypothesized Impact Pathway 4, which focuses on TEL MOOC participants further developing their skills through membership of online networks. Mamtaz explains:

> In 2018 I was selected as a Microsoft Innovative Educator Expert. As a result of the Microsoft Educator Community I have many more colleagues from around the world. I try my best to advance others in technical education as much as I have learned myself. After participating in TEL MOOC, I shared the TEL Activity Plan to those interested in other organizations and my own institution, and suggested creating and implementing them in the classroom.
>
> The whole world is a global village. Since I work as a British Council School Ambassador, Connecting Classrooms, I have to connect schools globally with the teachers and students in my country and around the world – Pakistan, India, Sri Lanka, Lebanon, Great Britain and many more also.

Mamtaz's globally-focused approach to disseminating the TEL techniques and knowledge she gained from participating in TEL MOOC is summarized in this video from her YouTube channel, which she created for a multimedia competition in connection with her work for the British Council as a teacher trainer[10].

Mamtaz's survey responses and the discussion with her in interview show TEL MOOC has made an impact across all four Impact Pathways but with contextual factors limiting that impact in respect of her own students' internet use (and engagement with TEL), and in respect of changes in her immediate colleagues' attitudes and practice (Impact Pathway 2), and with Impact Pathway 4 having a wider scope than was hypothesised in the draft TEL MOOC ToC.

7.2 Case study 2

Name	Ratu (not participant's real name)
Gender	Male
Age group	30 - 39
Country of residence	Fiji
Primary spoken language	Fiji Hindi
Employment status	Full-time employed/self-employed
Employment type	Face-to-face teaching
Sector	Elementary school
Subjects	Social science, Languages & linguistics, Science, Mathematics, Arts, Physical education.
Teaching experience	Over 10 years
Primary internet access means	Via an internet-enabled mobile phone (smartphone).

7.2.1 Skills and experience profile

Ratu teaches at an elementary level school in Fiji. He was particularly interested in discussing the factors that had limited him in implementing the skills and knowledge he had gained from participating in TEL MOOC.

[10] https://www.youtube.com/watch?v=heNtP-133rA&t=17s

Figure 6 shows that he is well qualified, has extensive teaching experience, and had very little OER use experience before studying TEL MOOC. Ratu is fairly skilled in some aspects of ICT use. He had not studied any MOOCs or other online courses prior to participating in TEL MOOC. Like Mamtaz, Ratu has has a fairly low aggregate score for 'online practice', gained from his use of social networks and discussion forums.

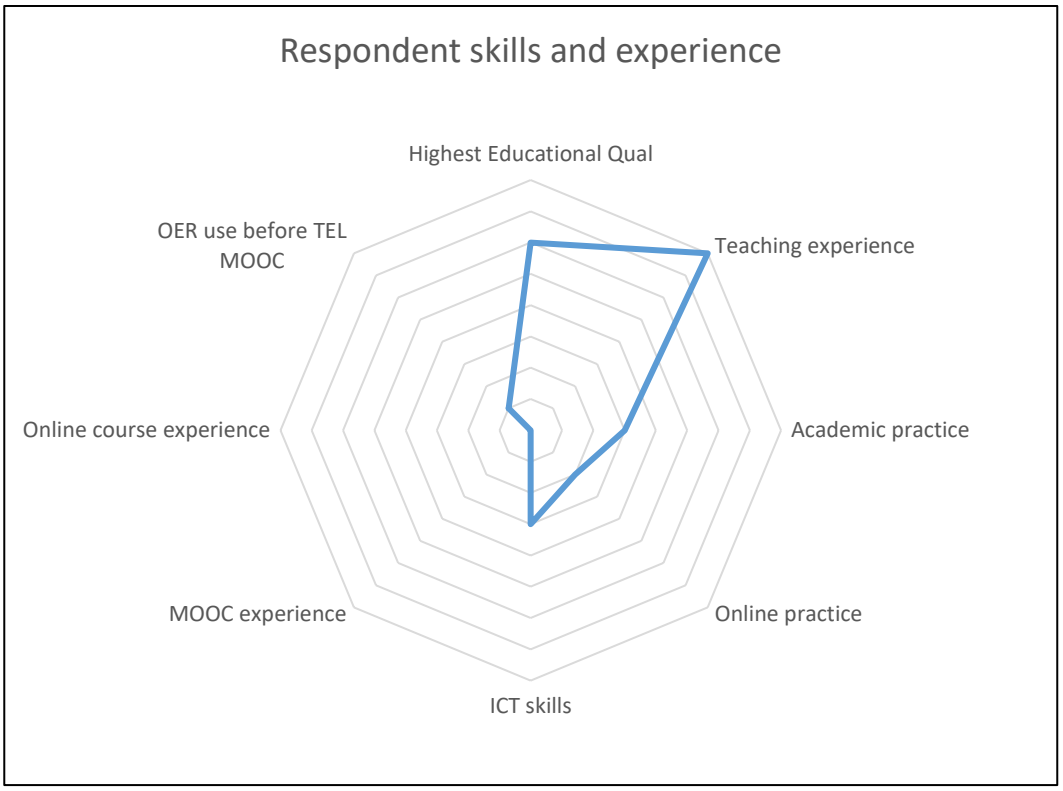

Figure 6: Case study 2 skills and experience profile

Figure 7 shows that, based on his survey responses, TEL MOOC had a moderate level of impact on Ratu's teaching (though below the sample mean) and a lower level of impact on his use of open educational practices, his collaboration with peers, and his professional development (all lower than the sample mean). In interview, Ratu explained the factors limiting the extent to which he was able to apply the skills he had gained from participating in TEL MOOC.

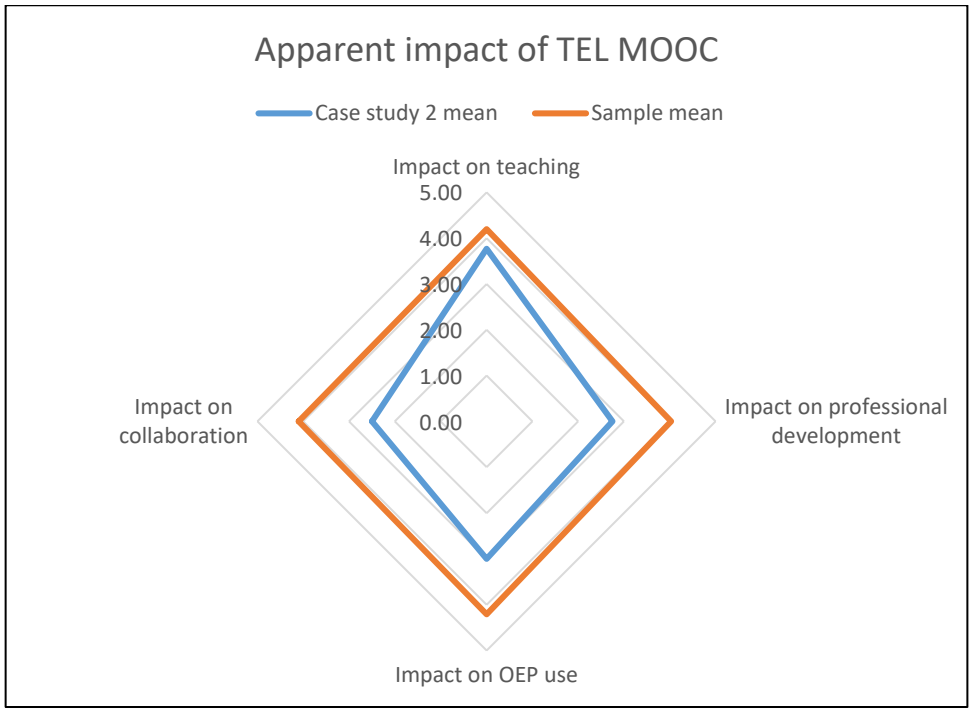

Figure 7: Apparent impact of TEL MOOC on case study 2

7.2.2 Impact Pathway 1: Impact on participants' practice and longer-term impact on student outcomes

Before studying TEL MOOC Ratu had very limited experience of teaching with technology and of using OER for teaching. In his survey responses, Ratu had indicated that a result of participating in the course he has made more use of OER in his teaching, uses a broader range of teaching and learning methods and technologies to support teaching and learning and experiments more with new ways of teaching.

In interview, Ratu suggested that one of the main ways in which his practice has changed as a result of studying TEL MOOC is in his use of OER. He commented:

> I have used OER in my teaching after I had done TEL MOOC. I have taken lessons, for example on climate change, and have shown videos from NASA website. My students were able to better understand the causes and effects of climate change on a global scale. Our class project was to find the causes and effects of climate on our country and at community level. Students understood the topic very well and also made up a plan on how to reduce the impacts of climate change at school level. They stated the introduction of zero burning and sorting out rubbish into paper and plastic. We were able to do this at class level and students also actively pursued composting at school level. I believe the usage of technology really inspired the students in achieving the outcomes of this lesson.

The skills he gained from participating in TEL MOOC have also allowed Ratu to better meet diverse students' needs:

> I had a child with Albinism. He had a very short attention span and could not see things from far. So I made him sit near the white board and used a projector often in the lessons, especially in science. His worksheets and tests were enlarged to support his learning. He was able to write quickly and at times, surprisingly, faster than his class mates. Then I had students who were slow learners. They were good at oral work and conversed a lot while seeing videos of lessons and gave positive feedback after lessons. They seemed to show a lot of interest in technology enabled lessons.

Like Mamtaz, Ratu identifies technological barriers to implementing in his own setting the knowledge and skills gained from TEL MOOC. His survey responses mention a lack of resources, ICT equipment and internet connectivity. In interview he discussed this in more depth:

> Some of the barriers I have come across is the lack of resources. Example most classrooms have blackboards and there is only one outdated projector in the school. There is a computer lab in the classroom with desktop computers but it does not have WIFI access. We also do not have interactive boards where we can engage students in learning in a meaningful way. Back in 2015 the government promised us one laptop per child but it did not materialize until now. Also the internet connectivity is slow. Due to the scattered nature of our classroom buildings we are unable to connect to internet of the main office. I requested for an outdoor WIFI signal booster but the head teacher says it is not budgeted for. Also teachers use their own laptops and their own data for lessons.

Ratu added that a lack of support from within his institution also limits the extent to which he can implement TEL in his school:

> Like I mentioned earlier, WIFI or internet access to our classrooms is limited. The school does not seem to look into our request for a signal booster. Even no intention is made to connect the computer lab with internet. Also no concrete steps are taken to purchase interactive boards or new projectors. One policy is that teachers are not supposed to use mobile phones and laptops in the classroom. Although we try to use phones as WIFI hotspot for our laptops, it comes at a risk. Some teachers are even reprimanded for its usage and once our school head told us to leave our phones and laptops in the office. Luckily no one obliged.

7.2.3 Impact Pathway 2: Changes in colleagues' practice

Impact Pathway 2 focuses on a multiplier effect whereby TEL MOOC participants share their knowledge and skills with colleagues, whose practice changes as a consequence. In his survey responses, Ratu had mentioned that unsupportive teaching colleagues had been a barrier to his applying the skills and knowledge gained from studying TEL MOOC. He also suggested that while he had shared information about technology-enabled learning with his colleagues, those colleagues did not appear to be changing their practice or attitudes. In interview, Ratu speculated on the possible reasons for this:

> Some teachers are unsupportive of the initiative of using ICT in teaching and learning because they seem to have little knowledge of it. I have shared ideas with my teacher colleagues but they seem to complain of lack of resources and a lack of training on it. I did tell my head teacher about this TEL MOOC course, but he seemed little interested. As I do not have a leadership position despite 19 years of service, I cannot do things my own way.

Ratu suggested that a further factor limiting his own, and colleagues' implementation of TEL is connected with curriculum constraints in Fiji:

> Curriculum content in my country is overcrowded. All classes have to complete the syllabus within two terms of 28 weeks. The third term is left for revision and exams. In some subjects there are at least 160 achievement indicators to be covered in some science lessons. This becomes tiresome and some teachers have resorted to rote learning. Fiji has an exam-focused education system. The school head also checks the lesson coverage per term and it is a must that it must be done.

7.2.4 Impact Pathway 3: influencing managers and institution leaders

Impact Pathway 3, whereby TEL MOOC participants influence leaders in their own institutions, resulting in policy change in respect of TEL implementation, has not been an option for Ratu, who was keen to discuss the lack of support for professional development (PD) in Fiji. He made a point commonly voiced in the survey responses – that educators in resource-poor settings are using their own money to buy computer equipment and internet data in order to allow TEL implementation and innovation:

> The school head, who has seen me do TEL MOOC, did not ask me to conduct a PD. Maybe he does not want to feel inferior in front of others as I have postgraduate qualifications in education and he just has a certificate in teaching. The only improvement in teaching and learning can be done when maybe I become the head teacher and have the power to influence and inspire teachers to use technology in

> teaching and learning. Till then my aim is to save money to buy equipment, and aspire to teach to the best of my abilities using technology enabled learning.

Ratu's experiences show that even when educators are highly motivated and are eager to implement TEL in their own institution, factors such as lack of managerial support and a lack of resources can make the task much more difficult. While a course such as TEL MOOC cannot transcend context-related challenges, it *can* equip participants to develop strategies to overcome some of those challenges and foster a spirit of determination and positivity about TEL that can lead to resilience in the face of adversity. The case studies and survey responses contain many such examples.

7.3 Case study 3

Name	Deepti (not participant's real name)
Gender	Female
Age group	30 - 39
Country of residence	India
Primary spoken language	English
Employment status	Full-time employed/self-employed
Employment type	Face-to-face teaching; Distance education
Sector	University
Subjects	Botany and environment science; science
Teaching experience	Over 10 years
Primary internet access means	Via a tablet computer or ipad.

7.3.1 Skills and experience profile

Deepti teaches at a university in India. She participated in TEL MOOC purely for professional development reasons, keen to find out more about elearning methods. Figure 8 shows that she is well qualified, has many years of teaching experience, and had used OER fairly extensively before studying TEL MOOC. Deepti suggested that she has only basic ICT skills and had not engaged much online, other than some discussion forum use, and the study of two other MOOCs and one other online course. Of the case studies, Deepti has the lowest aggregate score for 'online practice'.

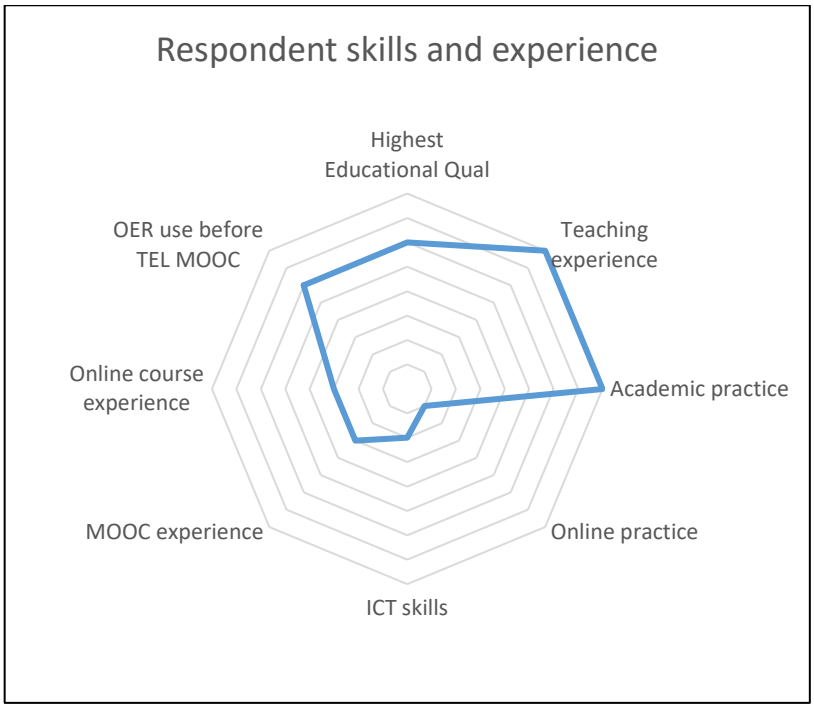

Figure 8: Case Study 3 skills and experience profile

Figure 9 shows that, based on her survey responses, TEL MOOC had a high level of impact on Deepti's teaching (above the sample mean) and on her professional development, and a moderate level of impact on her collaboration with peers and her use of open educational practices. In interview, Deepti gave a more nuanced explanation of the ways in which participating in TEL MOOC had informed changes to her practice, and the factors enabling and limiting the extent to which she was able to apply the skills she had gained from studying the course.

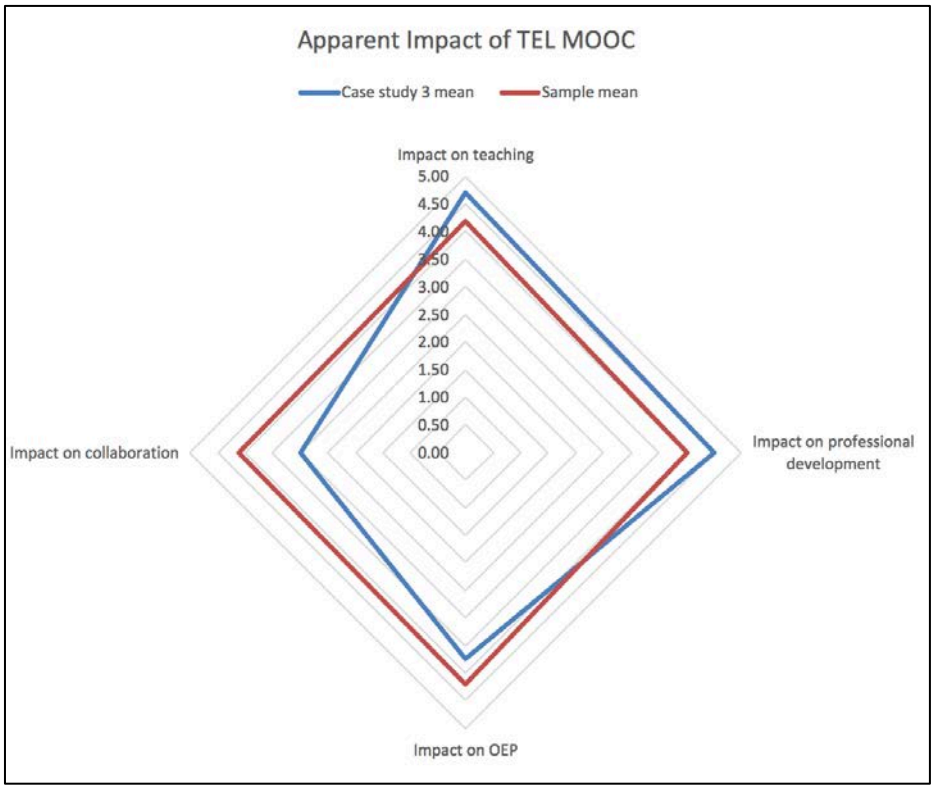

Figure 9: Apparent impact of TEL MOOC on case study 3

7.3.2 Impact Pathway 1: Impact on participants' practice and longer-term impact on student outcomes

Deepti began the interview extremely enthusiastic about the ways in which her teaching had been changed by participating in TEL MOOC. She noted the importance of her students' ICT skills in making changes in her practice possible and acknowledged the empowering potential of OER creation, adaptation and sharing:

> Within my own world of the university I have made so many changes, all instigated by my learning on TEL MOOC. I'm lucky that my students are au fait with technology, the internet, Facebook and the like. They're at home in that sphere of connected living and are fully enthusiastic about embracing new ideas and new medias. Once unlocking the door to TEL within my students I am learning great things from them too. They see what is possible and then imagine their own ways of using TEL to achieve their learning goals and support their peers' needs.
>
> Some people say that the pedagogy should drive the technology and not vice versa but I found this was not the case for me. After TEL MOOC I was so excited about new technologies and types of resources like OER that that pushed me to consider new ways of teaching with them. I'll give you an example. My students have to conduct their own small independent project so I introduced them to OER and how they could be used and adapted and so on. Many of my students used OER as resources for their project work and I'm proud to say that some of them made the adaptations and shared the newly adapted resource with the world. I think this is empowering them. They have something to give that is of value.

Continuing with her discussion of students' willingness to experiment with TEL, Deepti observed that structural barriers can limit this for some students, and that this limits the ways in which she is able to innovate:

> I would like to try flipping the classroom and setting my students tasks of viewing particular online videos and then coming together to discuss them. But students may not have the internet connection at home so this could cause divisions between the haves and have nots, so I don't try this.

Asked about the factors supporting her implementation of TEL, Deepti was eager to credit her institution for its "openness to innovation and to non-traditional approaches" – a position that contrasts with the experiences of Ratu:

> I'm very fortunate that my university has the resources to support my experiments in the TEL teaching. I have asked and I have got. My department head is fully supporting of me. I persuade him of the value of what I want to try and why it will be good for students, and he takes the ideas higher up and gets the approval and the money if needed. Without that level of support I don't think I could have made the changes I have done to this day.

Discussing her original motivation for participating in TEL MOOC – professional development – Deepti explained that her teaching changed in many ways since studying the course and that she now frequently compares her teaching with that of other people, largely by viewing YouTube videos:

> Studying TEL MOOC was like opening the door to a new world of teaching that I could study and reflect on, so I can change my teaching accordingly if the ideas are suitable and inspire me. In YouTube I can see examples of teaching in my subject in many corners of the world. I can watch what they are doing and think about whether it would benefit my students. I visit the Merlot website too and am attracted to OER accompanied by accounts of how they could be used. I aspire to share my own resources there when I have more time.

7.3.3 Impact Pathway 2: Changes in colleagues' practice

In her survey responses, Deepti indicated that her colleagues had been influenced by her study of TEL MOOC in respect of changed attitudes towards TEL and OER, and experimentation with new technologies and teaching approaches. Deepti explained that departmental level support has once again been a factor in respect of her colleagues implementing TEL strategies:

> I will talk about what I am doing in the staffroom and I will tell my colleagues how my students have great enthusiasm for their experimenting and are doing better in their studies and in their grades. I may show them my TEL MOOC Activity Plan and we talk about how they may use TEL in their subjects. If they need the resources, most of the department heads are fully supporting of them. We have that culture of support. That is very important because I have heard of others who have exactly the opposite reaction from their senior staff.

7.3.4 Impact Pathway 4: Development and influence through networking

While Deepti has been influenced by other educators outside her institution via her study of resources such as YouTube videos, she explains that making connections with peers online in order to share knowledge and discussion practice has been more difficult due to language problems and online safety concerns:

> Now I have to tell you my frustration and sadness. Within my university I have the support of dear colleagues and of my esteemed department heads, but I would like to connect with the teachers globally, visiting the online discussions. I will confess to you that I am afraid to do so. In India there are many instances of hostility against women who are speaking out online. Some men think women should not be taking an active role in public discussion alongside them…When I completed TEL MOOC I was so excited to continue learning more and more about TEL that I began to reach out to other teachers online to discuss what TEL could do in a classroom. I set up my Twitter account, used Facebook, joined groups but I had two problems. In English-speaking online and open places like Twitter I was made welcome but lack some confidence in my English language skills so this makes me cautious of posting. So I reached out to Hindi-speaking Facebook groups and discussion forums but it was a big problem for me. I received threats that I should stop contributing or there would be trouble for me. The disrespect for women that is everywhere in Indian society is also on the internet. I am very sad that I cannot fully realise my ambitions from studying TEL MOOC and make the connections with the global community because of the problems in my country.

Deepti explained that her experience of participating in open online spaces has influenced the teaching strategies she adopts with her students:

> I was so inspired by the TEL MOOC course leader Nathaniel. He seemed so confident on the global stage and inspired us to teach in a different way, as one human being to another human being connecting across the globe. I would like to show my students how to connect with the world and how open discussion online can broaden their horizons and open up opportunities for them. But I would be fearful of what may happen for the female students. It is my responsibility not to lead my students into harm's way, is it not? I won't just tell the male students so I don't tell anyone. I would like to know how to be safe on the internet so I can pass that knowledge on.

Deepti's experiences online, connected with her being a woman, have parallels with Mamtaz's comments about the cultural restrictions on girls' online participation existing in Bangladesh. They are yet another example of factors that can compromise the impact of a course such as TEL MOOC. While such a course could offer guidance around safe online practice, arguably only legislation and enforcement of that legislation by online platforms, can actually prevent gender-related cyber-abuse.

7.4 Case study 4

Name	Farouq Mensah (participant wishes his own name to be used)
Gender	Male
Age group	30 - 39
Country of residence	Ghana
Primary spoken language	English
Employment status	Full-time employed
Employment type	Face-to-face teaching; Distance Education
Sector	High school; University
Subjects	Mathematics
Teaching experience	7 to 10 years
Primary internet access means	At home using broadband

7.4.1 Educational setting

Farouq teaches at a Talim-ul Islam (T. I.) (Teaching Islam) Senior High School in the Ekumfi District of the Central Region of Ghana. He explained that:

> The establishment of the Talim-ul Islam schools in Ghana forms part of the Ahmadiyya Muslim Mission's humanitarian service aimed at providing high school education to under privileged communities in Ghana. Ahmadiyya, is a religious organisation that believes in the promotion of education and spiritual advancement within any community that it enters and thrives on the principle of high moral standards and discipline.

Farouq outlines the facilities at his school:

> We have 32 teaching classrooms, a current population of 1256 and an average class size of 40 students We have a 60 seater library, a 35 seater science laboratory and a 50 seater ICT laboratory with 20 working desktops. Students are discouraged from using mobile phones and personal laptops in school in the Ghanaian context and as such there are no sockets in the classrooms.

Farouq has a multi-faceted role at his school, being responsible for teaching Elective and Core Mathematics, assessing students and providing informed feedback; conducting research on student academic performance and attitude; and helping teachers integrate ICT in their teaching. He also serves as the school's information management system administrator and provides assistance in the organization of events

7.4.2 Skills and experience profile

Figure 10 shows that Farouq is very well qualified, has extensive teaching and OER use experience, is very skilled in ICT use, and had taken several MOOCs and other online courses prior to studying TEL MOOC. He has a fairly high aggregate score for 'online practice', with experience in using a virtual learning environment (VLE), sharing research and images online and contributing to discussion forums.

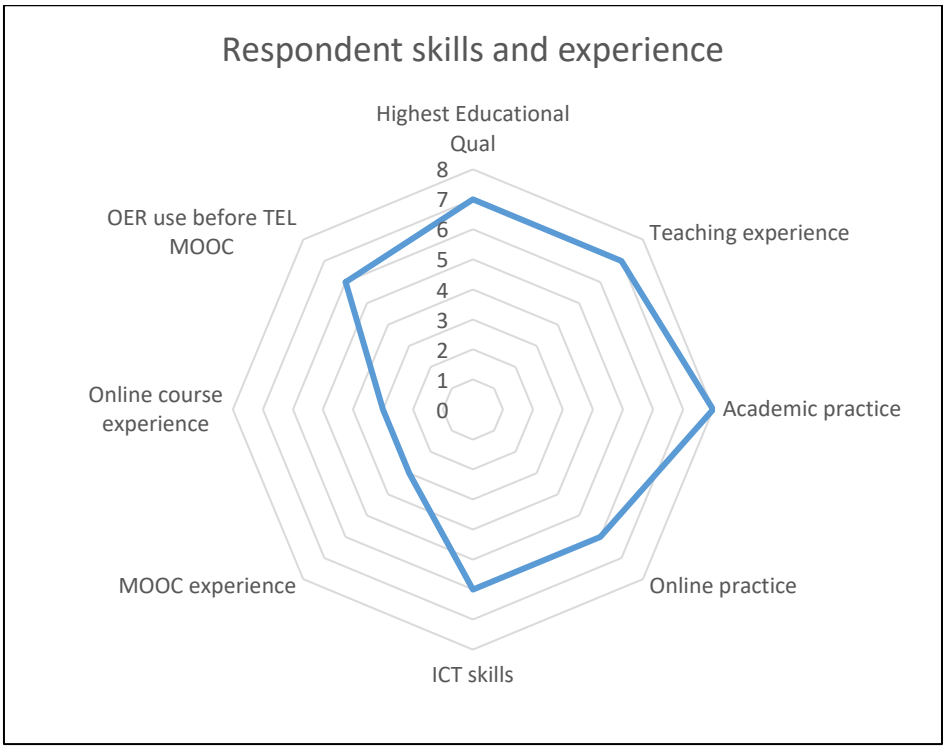

Figure 10: Case study 4 skills and experience profile

Figure 11 reflects Farouq's reporting that TEL MOOC had a high level of impact on his teaching, his collaboration with peers in his own institution and beyond, his open educational practices, and his professional development – impact greater than the sample mean for all four areas of practice.

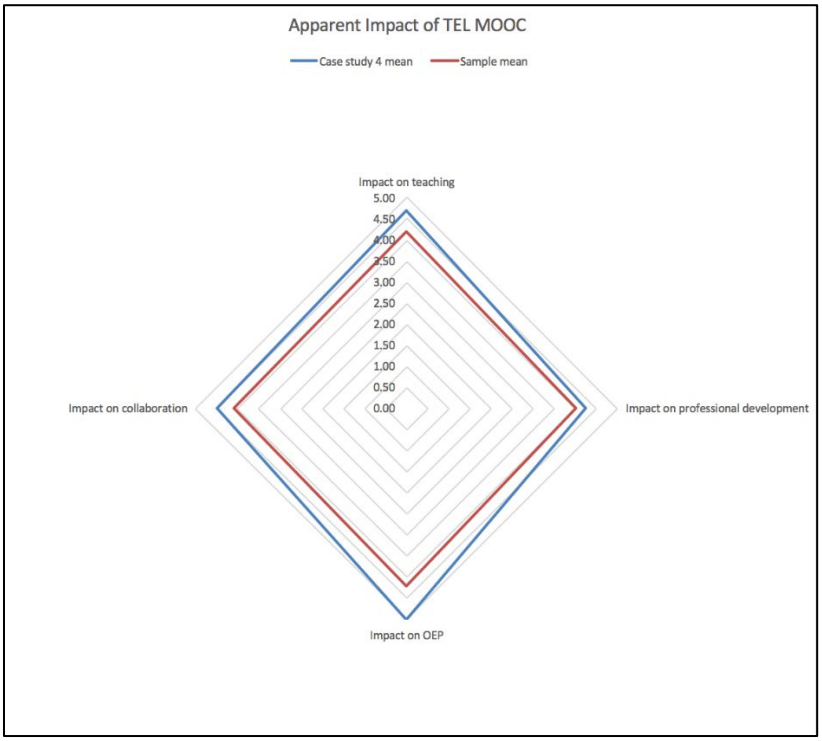

Figure 11: Apparent impact of TEL MOOC on Case Study 4

In interview, Farouq elaborated on his survey responses, giving specific examples of ways in which the knowledge and skills gained from TEL MOOC have influenced changes in his teaching.

7.4.3 Impact Pathway 1: Impact on participants' practice and longer-term impact on student outcomes

As suggested in Figure 11, Farouq was certain that studying TEL MOOC had led to him changing his practice. He explained that he has since been experimenting with new teaching methods and technologies including GeoGebra (an interactive geometry, algebra, statistics and calculus app), Excel, PowerPoint, a laptop and projector, YouTube videos, and virtual manipulatives. The latter are a relatively new technology used in mathematics education and modeled on existing manipulatives such as base ten blocks, coins, blocks, rulers, fraction bars, algebra tiles, geoboards, geometric plane, and solids figures. Virtual manipulatives are usually in the form of Java or Flash applets and allow teachers to provide learners with concrete models of abstract mathematical concepts.

In his survey responses Farouq was very positive about the apparent impact on his students of his studying TEL MOOC, in respect of their increased satisfaction, participation, interest, improved grades, their increased engagement with lesson content and experimentation with new ways of learning, their increased collaboration and resource-sharing, and their increased likelihood of attending school. In interview, Farouq elaborated on this, asserting that:

> The impact of integrating technology in teaching is enormous and ultimately increases student active participation in the instructional delivery and consequently improves students' achievement. The impact of studying TEL MOOC is reflected in my teaching methodology and consequently in my learners' learning outcomes. Using Excel to teach statistics is one practical lesson I taught just after studying TEL MOOC and my students have demonstrated understanding and retention.

He gave a further example of implementing TEL in his mathematics classroom:

> When students are introduced to translation by a vector, they often don't identify the effect the translation vector has on the points or objects. Each component of the translation vector has its own mysterious effect on the point or object. The behaviour of each object and its image is learned in isolation. Through the integration of technology investigations, students were made to compare the object and its image on the graph and make generalisation based on their observations. The students demonstrated high gains in the instructional delivery and were interested in having more of such lessons. Based on the students' response, I had to train my colleague maths teachers on how to develop similar lessons.

7.4.4 Impact Pathway 2: Changes in colleagues' practice

In his survey responses, Farouq had indicated that studying TEL MOOC had resulted in his collaborating more with colleagues within his own institution, and beyond that institution, but that the collaboration with his closest colleagues had not resulted in changes in their practice. Suggesting reasons for this, Farouq echoed points made by Mamtaz and Ratu in highlighting a lack of competency in the use of ICT, a lack of equipment such as overhead projectors and the unavailability of electric sockets in many classrooms, a lack of internet access and his colleagues' concentration on completing the defined teaching syllabus. Farouq also observed a preference for social rather than professional online participation: "My colleagues prefer to use the limited [internet] access and knowledge gained on social related or leisure purposes than for instructional delivery."

7.4.5 Impact Pathway 3: influencing managers and institution leaders

While structural barriers have limited the extent to which Farouq's influence on his colleagues has been realised as changes in their practice in respect of the implementation of TEL, he reported that he has been able to influence the school management, and inspire them with examples of his own use of TEL to improve learner outcomes:

> Through my initiative and constant engagement with students on technologies that assist students in learning, the school management have secured two projectors to help with the integration of technology in teaching and learning. The school used to report on students' achievement through pen and paper,

> however I have been able to influence the school management to secure online reporting system through the student information management system

7.4.6 Impact Pathway 4: Development and influence through networking

Online networking has been an important component of Farouq's professional development since completing TEL MOOC and he attributed this to skills gained through studying the course:

> Participating in TEL MOOC gave me the confidence and competence to connect with others online. Networking with others online has given me the opportunity to have access to varied instructional strategies and varied instructional materials I adapt in my instructional delivery. I have come to appreciate the effective use of GeoGebra Software through networking with others online to teach Circle Theorem.

Once more, a lack of equipment and poor infrastructure appears amongst the factors limiting the full impact of TEL MOOC. It's notable, too, that unlike many of the TEL MOOC participants who report using their own equipment and internet data to support TEL implementation, Farouq is suggesting his colleagues would prefer to prioritise using their internet data for social and leisure purposes. However, the fact that Farouq has been able to influence school managers, leading to their purchasing new equipment, is a promising development. In addition, he has clearly gained much from the experience of being part of the TEL MOOC learner community and has applied his networking skills to connect with peers around the world.

7.5 Case study 5

Name	Dr Karen Martinez (participant wishes her own name to be used)
Gender	Female
Age group	40 - 54
Country of residence	Belize
Primary spoken language	English
Employment status	Full-time employed
Employment type	Management/administration
Sector	Community College
Subjects	N/A
Teaching experience	N/A
Primary internet access means	Via an Internet-enabled mobile phone (smartphone)

Karen is Dean of a 2-year community college (Stann Creek Ecumenical Junior College) located in Dangriga Town in the Stann Creek District in Belize. She does not have a direct teaching role, but in her managerial capacity has been able to drive institution-wide TEL implementation and innovation, drawing on and inspired by her participation in TEL MOOC.

7.5.1 Educational setting

Stann Creek Ecumenical Junior College has a student population of between 400 - 500 students annually, with a full-time teaching faculty of 17 plus a few adjunct. Karen explained that that the students come from the surrounding villages and the town, varying in ethnicity and socio-economic background. The college has five feeder secondary schools, each with a different institutional focus - academic, vocational, technical and agricultural.

The College program concentrations are in science (Biology, Environmental Science, Mathematics, Computer Science, Health Studies), arts (Economics, Sociology, Spanish, History), business (Management of Business, Accounting, Economics, Tourism and Hospitality Management), and education (Primary Education and Early Childhood). The college also offers certification courses in education (Primary, Leadership and Early

Childhood). The community college is managed by a Board of Governors - a cross-section of stakeholders within the district. Karen is responsible for the daily administration of the college, dealing with academics, human resources, finance, students, records, facilities and public affairs, and is secretary of the Board of Governors.

7.5.2 Skills and experience profile

Figure 12 shows that Karen is very well qualified, has no teaching experience, some OER use experience, is skilled in ICT use, and had taken several MOOCs and other online courses prior to studying TEL MOOC. She has a high score for the 'online practice' component of experience of Figure 12, based on her experience of microblogging (e.g. Twitter), personal blogging/wiki use, uploading and downloading podcasts, discussion forum and video chat use, social networking, and VLE use

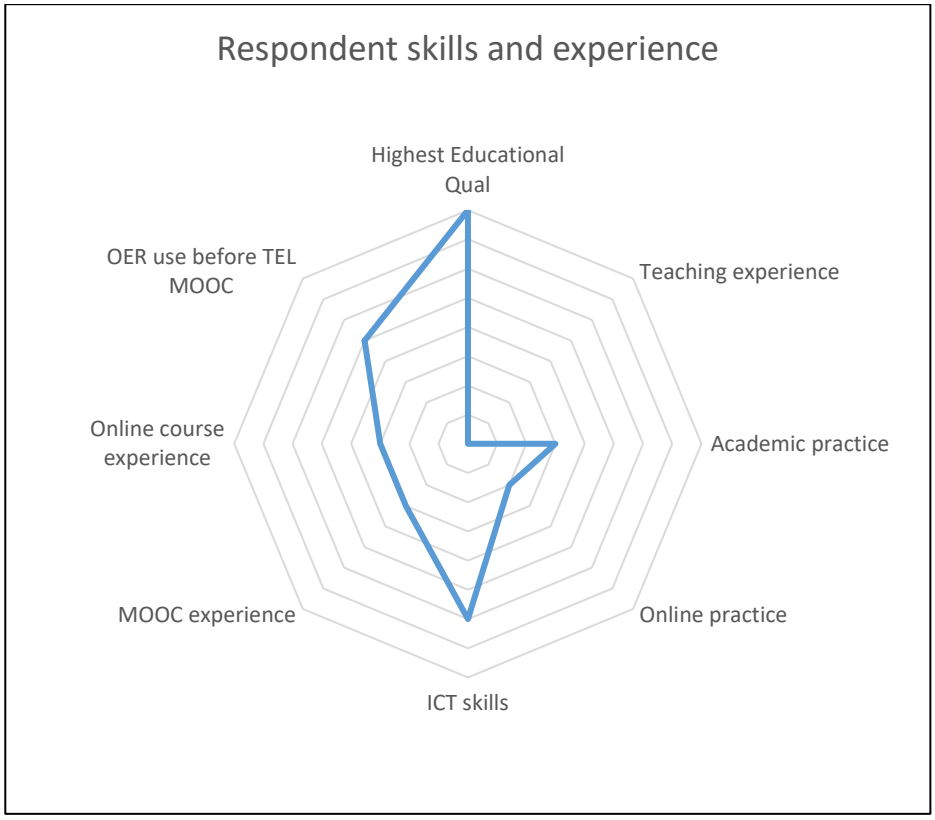

Figure 12: Case study 5 skills and experience profile

Figure 13 shows that Karen perceives TEL MOOC as having a high level of impact on her practice, professional development and OER use, with slightly less impact on her collaboration with colleagues and peers outside her own institution.

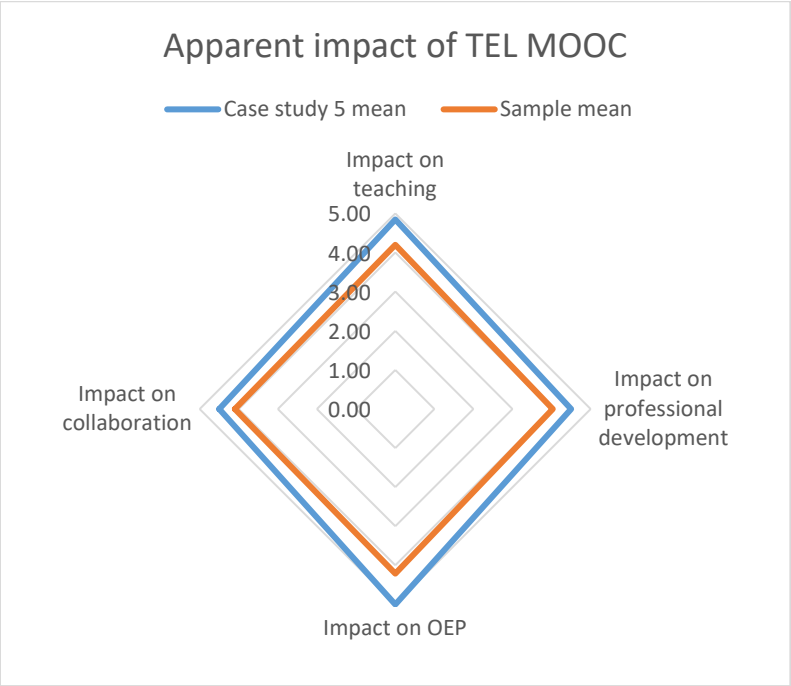

Figure 13: Apparent impact of TEL MOOC on Case Study 5

In interview, Karen gave examples of ways in which TEL MOOC has led to changes in TEL-related practice in her institution, and resulted in her increased use of open educational practices.

7.5.3 Impact Pathway 1: Impact on participants' practice and longer-term impact on student outcomes

Karen has no direct teaching role and explained that changes in her practice resulting from her participation in TEL MOOC were more focused around gaining increased confidence in, and positivity about the implementation of TEL and the use of OER, an increased "openness of spirit", and increased sharing of resources and ideas with others within and beyond her own institution. This, in turn, has led to impact that is relevant to Pathways 2, 3 and 4, discussed below.

7.5.4 Impact Pathway 2: Changes in colleagues' practice

As Dean of Stann Creek Ecumenical Junior College, Karen is in a good position to influence others. In her survey responses, Karen had indicated that she has been collaborating more with colleagues as a result of studying TEL MOOC and had shared the openly licensed TEL MOOC resources and materials with them. As a result, she explained, TEL MOOC was having a very positive impact on those colleagues in terms of their increased confidence in using, and experimentation with TEL and OER, and their increased reflective practice.

Karen has also led institution-wide implementation of TEL grounded in the knowledge and skills she gained through participating in TEL MOOC. She gave some examples:

> We've now made it mandatory for all faculty members to incorporate a field trip or practical component to all their subjects. They're required to communicate and interact with their students via some form of online social networking tool to encourage informal learning and building of social capital, though that hasn't been made mandatory yet.
>
> We share institutional information with students using Twitter, Instagram, WhatsApp, and Facebook. The students on internship, in education, communicate with me, their supervisors and each other via WhatsApp, Twitter, and Moodle. We now deliberately ensure we incorporate more social presence into our use of technologies. Traditionally we simply changed medium – for example, moving from lecturing using paper and pen to projector and screen.

Prior to her participating in TEL MOOC, Karen had already begun driving TEL implementation in her college on

a small scale. Her study of TEL MOOC gave momentum, increased focus and increased scope to this work. She explained that since 2016 the college had been facilitating the provision of online training to faculty on an annual basis, and that this online training has been a way of sharing the knowledge and skills she has gained through participating in TEL MOOC, and of further driving technological innovation in the college:

> Though all faculty members are required to attend training, the adoption of technology in teaching has been voluntary. We've been trying to limit resistance as we slowly implement use of technology. We are planning to change this for next year, that is, to make it mandatory. About 40% of faculty have implemented some form of stable online interaction with their students. We have built an institutional learning management system – Moodle - and have been offering most of our education courses in blended modality since 2016.

Karen also discussed the ways in which participating in TEL MOOC had led to the increased use of OER in her institution, and specifically the use of open textbooks:

> We encounter problems in purchasing textbooks. Barriers include costs and unavailability. I have encouraged faculty to use open textbooks in their lessons and now I am able to provide them with sites to visit – for example OpenStax, BC Campus, Saylor and Merlot. The faculty, mostly in the science and arts departments, have begun to use these resources. We will have a school-wide workshop before the end of this school year to incorporate use of open textbooks completely into our teaching, learning and institutional policy.

Discussing the challenges she continues to encounter when attempting to put the knowledge and skills gained through studying TEL MOOC into practice, Karen echoed points made by other case study participants: "My greatest challenge is the lack of technical expertise on campus. There is so much we can do!" She explained that the maintenance of the college Moodle site and website is outsourced, and that the website has been "poorly maintained so far, it is not regularly updated, though the college is currently working to improve this". She continued:

> We have only one person responsible for IT. He has full teaching duties. We are trying to get another person with technical expertise. This is difficult because people like these get more money working in the private sector than with schools based on a prescribed government pay-scale.

While there has been widespread attitude change in her college, with greatly increased positivity about the implementation of TEL and the use of OER, Karen explained that a lack of funding, a rigid curriculum, and performance targets, continue to limit the extent of TEL implementation:

> Although there is now an awareness of the need to effectively incorporate technology into teaching/learning at my institution, there are many limiting factors to it. We are still struggling with licensing - having to purchase MS office software. We presently purchase this for the computers in the administrative offices, a computer in the library, and one in the staff room. All other computers use Open Office.
>
> The college is sustained from tuition fees collected from students. We have no one who donates to the institution. We budget for what we need in advance. For example, we changed all our 50 computers going to three years now. We will not be able to make any change in the near future because funds will be used for other vital developments.
>
> We have two traditionally furnished computer laboratories controlled by a server and with full high speed internet access. We have about 8 working overhead projectors that are used by faculty. We do not have a special room where faculty can take their students for a quality technological experience, interactive and fully equipped with current equipment.
>
> Added to these is the rigid curriculum and exam oriented education system we have. Institutions are awarded for their performance in examination, yet required to be innovative. This is a dichotomy that

> we face everyday.

Other limitations on innovation include a lack of government policy around the implementation of TEL, Karen explains:

> As an administrator, my job is difficult in that I have to seek ways to convince my people to try something different - something somewhat unsafe in that it carries a degree of uncertainty. Most are hesitant to move from what they know and believe to have been working for them. Lack of governmental push or policy makes it even more difficult to convince teachers to change their practices.

7.5.5 Impact Pathway 3: influencing managers and institution leaders

Karen's influence in respect of TEL implementation has not been restricted to her immediate colleagues, and includes promoting the value of participating in TEL MOOC to peers within and beyond her own institution:

> I requested three years ago, from a ministry personnel, an update on opportunities for training in TEL. She sends me a link every time there is an opening. I share this with my colleagues at the tertiary level. So far, I have convinced my outgoing Board of Governors chairperson to take and complete TEL MOOC and the now present Stann Creek District Education Manager, along with some members of my staff.
>
> My Assistant Dean completed a certificate course in TEL last year. My head of department for education did so year before. All my heads of departments this year, along with some more faculty members, have indicated interest to take the TEL MOOC training to start the end of this month.

7.5.6 Impact Pathway 4: Development and influence through networking

In addition to influencing colleagues and peers within her own college, Karen has reached out to peers within local colleges in respect of the implementation of TEL and use of OER, building on the networking skills and experience she gained through participating in TEL MOOC:

> I have learned that education is about sharing. The more you share, the easier it will be for knowledge to be transmitted. I have found out that a collaborative learning environment, both internal and external, decreases the strain of having to start something new from scratch. I assisted two colleges with information by allowing them access to our learning platform when starting their school leadership program. They in turn shared very important information with me that we will need for our quality assurance internal review processes.

Karen's collaboration and knowledge-sharing with other institutions includes her raising awareness of the affordances of OER, and where relevant resources can be found:

> A colleague of mine asked me for information on textbooks that we used to purchase for chemistry and environmental science. She wanted to know where she could purchase these, and if we can allow her students to buy from us. I gave her the information on OpenStax textbooks that her students can download for free and her faculty can use to prepare lessons. She said her faculty have shown interest.

Karen was keen to explain how the skills she developed, and knowledge she has gained through participating in TEL MOOC have been relevant for many aspects of her role:

> I believe that my outlook on education has been transformed. I worked collaboratively with personnel from Campbellsville University in the United States to roll out the National Early Childhood program in 2017. I had to learn how to navigate the online platform, upload information to share, and also ensure that persons I communicate with get the information I intended to transfer. I had to consciously ensure I incorporate cognitive, teaching and social presence. The skills I developed through participating in TEL MOOC were invaluable here.

> In fact the experience has been awesome. For the first time too, I understood certain processes like engaging in writing proposals and not just taking information at face value. Many things are taught to us as a given here. We seldom get the opportunity to engage in creation of knowledge. Sharing of knowledge is usually limited to persons in your immediate environment, for example your department, if you are a teacher. Outside of this, information is passed down from the Ministry of Education. Junior Colleges do not get much attention from the ministry though. There is limited sharing of best practices in my country. We do not have a culture of sharing that is enhanced by technological transmission. Sharing is usually by personal recommendation. I am trying to change that by example. The journey continues.

7.6 Learning from the case studies

The five case studies highlight the extent of TEL MOOC's impact on teaching, learning and student outcomes across very diverse geographical contexts and education settings. They give an insight into the scope and scale of change that can result from participating in a short course such as TEL MOOC, and also into the factors that can block change. Some of these, for example lack of resources, are quite universal. Others are more specific to particular contexts, for example attitudes towards girls' education and online participation. Overall though, the case studies have allowed further investigation of issues emerging from the survey results, in addition to providing a nuanced picture of ways in which the four hypothesised Impact Pathways are being realised (or not) for specific individuals in specific contexts. This is discussed in more depth next.

8. Discussion, recommendations and revising the TEL MOOC theory of change

It is clear that TEL MOOC has been very effective as a mechanism for short-term, mid-term and long-term impact on a variety of stakeholders. The recommendations emerging from this evaluation focus less on changes that should be made to the course, which is clearly very effective in its current form, and more on work that the Commonwealth of Learning and the global education community can do to further maximize the impact of TEL MOOC and, more generally, further contribute to achieving SDG 4, Quality Education, and SDG 5, Gender Equality.

The findings reported in Sections 6 and 7 offer persuasive quantitative and qualitative evidence in support of each of the four impact pathways featured in the draft TEL MOOC ToC.

8.1 Impact Pathway 1

The collected data indicates widespread increased confidence in, and positivity about the implementation of TEL and the use of OER amongst TEL MOOC participants in diverse educational sectors and settings, across equally diverse geographical and cultural contexts. Participants also give extensive evidence of changed practice resulting from their study of TEL MOOC, including experimentation with new technologies and pedagogies, use of open educational practices, and increased reflection on their own teaching. Participants' reports of improved learner outcomes, including increased retention and attendance at school or college, are particularly heartening, and are indicative that TEL MOOC is having an impact that extends beyond its participants and their immediate colleagues.

Recommendation 1
Continue running TEL MOOC for as long as funding allows, as the impact evaluation study has collected persuasive and plentiful evidence of its short-, medium- and long-term impact across diverse settings and sectors.

Recommendation 2
Promote TEL MOOC even more widely, to increase its reach and potential impact, and target women in particular, bearing in mind the fact that each TEL MOOC presentation thus far has had more male than female participants, as noted by Cleveland-Innes et al. (2019; 2018; 2017).

Institutional leadership emerges as very powerful in both driving/supporting, and in blocking the implementation of TEL and the use of open educational practices. Many of the other enabling factors mentioned in the literature summarised in Section 3.3.1, for example educator skill, government policies and legislation, collegial discussions, and ICT-literate students, have been cited as supporting TEL MOOC participants' changed practice. In addition, TEL MOOC emerges as being a stepping stone for other online study, giving learners the motivation to study other online courses and the skills to make the most of participation in those courses.

Of particular note are the factors that appear to be limiting TEL-related practice changes amongst the TEL MOOC participants, for example infrastructure barriers such as unreliable or slow internet access, power outages and the cost of internet data, institution-related barriers such as lack of time, workload pressures, lack of funding to purchase up-to-date hardware and software, and lack of IT support; lack of ICT skill amongst educators and managers; and attitudinal barriers such as scepticism about the value of TEL at managerial level. An important finding is the extent to which individual educators are taking matters into their own hands in the attempt to remove these barriers, for example by purchasing laptops and data bundles themselves.

Recommendation 3
Include in TEL MOOC examples of strategies that previous participants have adopted to address challenges they face when implementing TEL in their own setting and context. These could be of value to future participants.

Recommendation 4
Further develop strategies for influencing institution leaders' attitudes about the value of TEL and OEP, bearing in mind the evidence of institution leaders' potential to inhibit the impact of TEL MOOC.

8.2 Impact Pathway 2

The TEL MOOC evaluation has gathered clear evidence of a multiplier effect whereby TEL MOOC participants are sharing knowledge and resources with their immediate colleagues, resulting in those colleagues' practice changes and in improved outcomes for learners. The TEL Activity Plans are repeatedly mentioned as being shared with colleagues as a focus for discussion of TEL implementation, indicating their value as an important component of the course. However, once again impact is limited by structural, technological, skill-related and attitudinal barriers that could in part be reduced through attitude and priority changes at institutional leadership, and government level.

Recommendation 5
Retain the TEL Activity Plans and continue to encourage TEL MOOC participants to share them as open resources.

8.3 Impact Pathway 3

TEL MOOC participants' positivity about TEL and OER, their increased confidence and skill, and their being able to demonstrate improved learner outcomes, appears in many cases to be a strong basis for their influencing managers and gaining support for the implementation of TEL and use of OER, for example in terms of the provision of much-needed resources. However, the evaluation data also gives many examples of managers not being receptive to change, and of educators' attempts to improve learners' outcomes through TEL-related innovation being met with indifference or hostility.

8.4 Impact Pathway 4

The value of TEL MOOC as a network in itself is clear. Participants have welcomed the opportunity for knowledge-sharing within that network, the opportunity to learn networking skills from their peers and from the course facilitators, and the chance to practice those skills by being part of a massive online cohort of learners. Participants' subsequent use of online networks to further develop their practice and openly share resources has been repeatedly mentioned, again demonstrating the potential of TEL MOOC to achieve impact, including capacity building, on a global scale through a multiplier effect. TEL MOOC's open license is important here,

allowing the course and its resources to be freely shared, and once more the TEL Activity Plans are a particularly valuable as a shareable artefact.

While online safety was not directly covered in the survey, the experiences shared by Deepti in Case Study 3 are concerning, especially in the light of other evidence (e.g. Cyber-Crime Convention Committee, 2018; Gurumurthy and Chami, 2014) showing the global prevalence of technology-mediated/cyber-violence, especially against women and children. Future research could usefully explore this in more depth.

Recommendation 6
Continue to develop the Commonwealth of Learning TEL community of practice and to promote it amongst TEL MOOC alumni and future participants as a safe space for knowledge-sharing and discussion.

Recommendation 7
Consider holding an open online conference for TEL MOOC alumni, allowing them to showcase their work to interested peers globally. The Open University online conference for Masters in Online and Distance Education module *H818 The Networked Practitioner* offers a possible model for this.

Recommendation 8
Consider running a further MOOC covering advocacy and leadership strategies and/or online networking and identity-building. The Open University's *The Online Educator* MOOC has content that could be repurposed to this end.

Recommendation 9
Consider including guidance about safe online practice in TEL MOOC, or direct participants to relevant resources.

Recommendation 10
Bearing in mind the fact that the TEL MOOC impact evaluation study sample has an uneven gender balance, consider doing further research focused on female participants' experiences. This research could extend to exploring gender-related barriers to TEL implementation, for example those connected with cyber-violence and online safety.

8.5 Revising the Theory of Change

On the basis of the collected data, the draft TEL MOOC theory of change (Figure 2) was revised to reflect the evaluation findings. The new ToC appears as Figure 14. The four Impact Pathways, and their constituent elements, are retained, as the evaluation data gives extensive supporting evidence for short-term, mid-term and long-term impact for each Pathway, as discussed in Sections 6 and 7 of this report and summarized above. Some aspects of the ToC have been amended. Based on the evidence from Case Study 1, Impact Pathway 3, box F, gains a new component – influence of institution leaders beyond TEL MOOC participants' own institution. In addition, Impact Pathway 4, which hypothesizes that TEL MOOC participants will develop networking skills through their study of the course, and further develop their practice through online networking with peers, has gained another element, box L – whereby distributed peers outside the TEL MOOC participant's home institution are influenced by the TEL MOOC participants and change their own practices. This has potential to be a particularly powerful impact mechanism, with global reach, evidencing a multiplier effect whereby skills and knowledge are cascaded through online networking.

8.5.1 A new Impact Pathway?

In light of some of the survey evidence and the wealth of resources that have been created and openly shared by TEL MOOC participants (notably Mamtaz, Case Study 1), during and after their study of TEL MOOC, box B also gains a mention of OER creation. A future revision of the ToC could perhaps feature a distinct Impact Pathway for the creation and sharing of OER focused on TEL pedagogies, reflecting the teacher-training, and leadership-influencing function of this activity and its potential to increase TEL capacity globally, where those OER are well promoted.

8.5.2 Finalising the assumptions

The evaluation data also gives extensive evidence, from diverse contexts, of the factors that can enable or limit the impact of a course such as TEL MOOC – addressed in the 'Assumptions' boxes of the ToC. All of the assumptions in box 2 are evidenced in the collected data both in terms of their function in enabling the varieties of impact outlined in the four Impact Pathways and their potential to limit/prevent that impact where an assumption is not true for a particular TEL MOOC participant. The many differences across the survey respondents, and the various country- and sector-specific commonalities, highlight the fact that contextual factors influencing impact are not homogeneous and that removing barriers to TEL implementation requires attention to local circumstances and collaboration with local educators, rather than advocacy on a 'one size fits all' basis, at global level.

The evidence is particularly persuasive and extensive for the ways in which lack of resources (for example hardware, software, funding for new technologies such as interactive whiteboards, and reliable internet access) can restrict the implementation of TEL even when an educator is very skilled in TEL pedagogies and enthusiastic about effecting innovation. The influence of supportive/non-supportive peers in enabling/limiting OER use and TEL implementation is also apparent from the collected data. The evaluation data also gives numerous examples of the factors enabling/limiting TEL MOOC participants' influence of institution leaders and subsequent policy and practice changes. In addition, Case Study 3 gives evidence of the ways in which impact can be limited due to women being deterred from open online participation as a result of cultural restrictions and the fear of online abuse (assumptions XI and XII). Two new assumptions have been added to the box, grounded in the Case Study 1 interview, and some of the open ended comments from the survey, regarding the impact of illiteracy on the implementation of TEL (assumption XVI) and parents' concerns about internet safety and content appropriateness leading to their not wishing their children to use online resources and websites (assumption XVII).

The assumptions in boxes 3 and 4 are also supported with evidence from the TEL MOOC evaluation study, and are also retained. For example, in some of the poorest countries in which the TEL MOOC participants reside the purchase of new equipment cannot be an institutional priority.

8.5.3 Contributory factors

The 'contributory factors' boxes on the left hand side of the TEL MOOC ToC list factors that may also be contributing to the varieties of impact being attributed to TEL MOOC as a facilitated course, as a network and as open resources. These factors have been refined on the basis of the evaluation data and some have been combined.

In respect of Contributory Factors boxes 1 and 2, which have identical contents, some changes have been made. For many of the survey respondents, implementing the knowledge and skills gained from TEL MOOC would not have been possible had they not invested in equipment such as laptops and smartphones, and in internet data. A new factor has therefore been added – educators being willing and able to buy hardware, software and internet data themselves. Colleagues and other peers' support also emerges as making a significant contribution to impact and has been retained as the evaluation data gives plentiful evidence of TEL MOOC participants' changes in practice being inseparable from collaboration with, and support from, colleagues and other peers.

While there was minimal evidence of TEL MOOC participants' changed practices in respect of TEL implementation being driven by institutional performance targets and aspirations for promotion this contributory factor is retained as, when present, it can accelerate TEL implementation, altering the balance between TEL MOOC's contribution to impact and the contribution made by other factors. Government policies are retained as a contributory factor as there is evidence of policy change allowing TEL innovation in settings where this was previously not possible. The contributory factor 'Other professional development activities' has been retained as while the impact of TEL MOOC is clear many participants report having participated in other professional development-related activities since completing the course and it is likely that these activities will also have influenced changes in practice around TEL, as mentioned by some of the survey respondents. The hypothesized contributory factor "financial incentives for TEL implementation" has been removed as there is no evidence for this in the collected data.

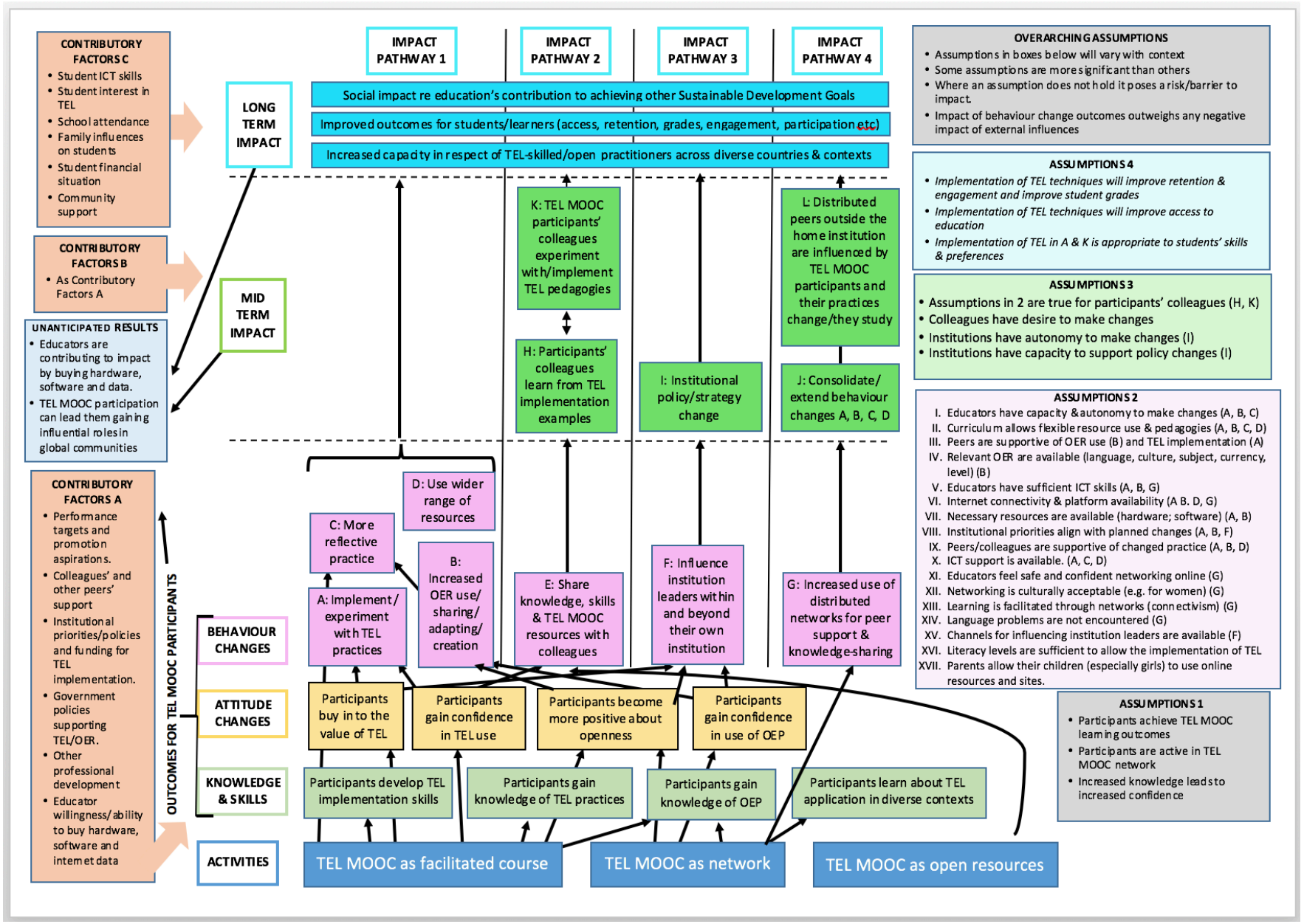

Figure 14: Revised TEL MOOC impact evaluation theory of change

9. Conclusion

In its use of a theory of change framework, adapted to fit with the principles of contribution analysis, a mixed methods study including case studies supported by data collected via qualitative interviewing, and comparison of impact mechanisms across diverse case studies and contexts, the TEL MOOC evaluation has been able to answer three general questions.

9.1 According to participants, what difference did TEL MOOC make for their lives, and especially their professional practice?

The evaluation data gives extensive evidence that TEL MOOC has resulted in attitude and behaviour changes for participants in a variety of roles – including educators, managers and researchers – across many different education sectors, levels and formats, and in an equally diverse range of geographical settings. Participants report increased positivity about the value of TEL and of OER, increased confidence in implementing new technologies and pedagogies and in adopting open educational practices, increased willingness to experiment with new teaching and learning methods and learning design techniques, and increased reflective practice as education professionals.

In addition, TEL MOOC participants report increased collaboration with colleagues in their own institution and beyond, leading to a multiplier effect whereby knowledge, skills and resources are shared with those peers who, in turn, often begin experimenting with TEL and OEP in their own practice. TEL MOOC participants also report a positive impact on their learners' study outcomes, including improved grades and engagement, increased attendance at school/college and increased retention.

9.2 More generally, what works, why, how, for whom and under what circumstances?

The three elements of TEL MOOC identified in the ToC – TEL MOOC as a facilitated course, as openly licensed resources, and as a network – all appear to contribute to short-, medium- and long-term impact on participants and on other stakeholders. In respect of TEL MOOC as a facilitated course, the evaluation findings suggest that the TEL Activity Plans are particularly effective in supporting participants' learning during their study of the course, in supporting their application of newly gained knowledge and skills to their own practice, and as a focus when cascading knowledge and skills to their colleagues and to peers online. The TEL MOOC instructors' facilitation is also shown to contribute to the course's impact in modelling an example of online facilitation. While evidence of short-term impact on TEL MOOC participants' attitudes and behaviour is plentiful, it is also clear that TEL implementation and the adoption of open educational practice are most effective where practitioners have the support of teaching colleagues and, in particular, the support of managers and institutional leaders. The availability of funding for the purchase of new technologies, and of a reliable and fast internet connection, is also shown to support innovation and is lacking in many TEL MOOC participants' settings.

In addition, for many TEL MOOC participants, the experience of being part of a massive cohort of learners is effective in developing networking and collaboration skills that can lead to ongoing knowledge-sharing and peer support long after they have completed the course. In this latter respect, TEL MOOC's open license increases impact, allowing participants to share resources in addition to sharing knowledge. However, the case study testimonies, in particular, give an indication that cultural constraints, gender-related inequalities, and language barriers can limit opportunities for networking in this way. Furthermore, TEL MOOC participants who were already experienced in the use of social networking sites were most likely to benefit from this aspect of the course's impact.

9.3 How does TEL MOOC work in combination with other interventions or factors to make a difference?

TEL MOOC is not achieving impact on participants and other stakeholders in isolation. For example, as shown in the 'Contributory Factors' boxes on the ToC, in many cases the impact of the course could not be realised without TEL MOOC participants being willing and able to invest time and money on TEL implementation, for

example through the use of their own devices in the classroom, and the purchase of laptops, software and internet data. In addition, TEL MOOC is often just one of several professional development opportunities influencing changes in practice and the subsequent outcomes for learners. Even so, evidence from the evaluation suggests that for some TEL MOOC participants, their study of the course was a springboard for that subsequent professional development, for example in developing confidence in studying online, understanding of the MOOC format, awareness of professional development-related OER and a more reflective approach to their practice. One of the hypothesised Pathways to Impact featured in the TEL MOOC ToC concerns participants' influence of managers and institution leaders as a route to subsequent changes in institutional policy and priorities. The evaluation has indeed offered evidence of TEL MOOC participants being able to demonstrate to their managers and institution leaders the benefits for learners (and the institution) of implementing TEL and of using OEP, resulting in support for such innovation including the investment of money and human resource.

Bearing in mind the impact of educational access and equity on achieving Sustainable Development Goals other than Goal 5, Quality Education, it is reasonable to assume that the impact of TEL MOOC is even more extensive than outlined in this evaluation report. Future research could usefully seek to triangulate some of the findings, for example by studying institution-provided data about learners' achievement and by surveying TEL MOOC participants' colleagues. Future research might also explore demographics-related, and context-specific differences in the survey responses in greater depth, for example by conducting additional interviews with TEL MOOC participants in order to develop further iterations of the TEL MOOC theory of change and gain an even deeper understanding of the mechanisms involved in TEL MOOC's much-needed impact on its many stakeholders, and on society more generally, across the very diverse nations of the Commonwealth.

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11. Appendices

11.1 Appendix 1: The TEL MOOC impact survey tool

	1. ABOUT YOU	
	I completed: TEL MOOC 1 TEL MOOC 2 TEL MOOC 3	Single choice
	I received a Certificate of Completion Certificate of Participation	Single choice
1_1	**Please specify your country of residence**	**Drop down list of countries from where TEL MOOC participants come**
1_2	**What is your primary spoken language?**	
	English	
	Other (please specify)	OPEN QUESTION
1_3	**What is your gender?**	Single choice
	Male	
	Female	
	Transgender/non-binary	
	Prefer not to say	
1_4	**What is your age group?**	Single choice
	Under 20	
	20 - 29	
	30 - 39	
	40 - 54	
	55 and over	
1_5	**What is your highest educational qualification?**	Single choice
	Secondary/high school diploma	
	College certificate or diploma	
	Vocational school certificate or diploma	
	Bachelors degree or equivalent	
	Masters degree or equivalent	
	M.Phil or equivalent	
	PhD or equivalent	

	No formal qualification	
	Other (please specify)	OPEN QUESTION
1_7	**Do you have a teaching qualification?**	Single choice
	Yes	
	No	

	2. YOUR EMPLOYMENT	
2_1	**What is your employment status? (Select all that apply)**	Multiple choice (multiple answers)
	Full-time employed/self-employed	
	Part-time employed/self-employed	
	Full-time voluntary work	
	Part-time voluntary work	
	Full-time formal student	
	Part-time formal student	
	Unwaged and seeking employment	
	Unwaged with domestic responsibilities	
	Disabled and not able to work	
	Retired	
	Other (please specify)	OPEN QUESTION
2_2	**What does your job involve? (Select all that apply)**	Multiple choice (multiple answers)
	Face-to-face teaching	
	Distance education	
	Online teaching or facilitating	
	Blended/hybrid teaching (face-to-face and distance or online)	
	Work-based training	
	Research	
	Management/administration	
	Education support services	
	Other (please specify)	OPEN QUESTION
2_3	**If your job involves teaching or training, at which levels do you teach? (Select all that apply)**	Multiple choice (multiple answers)
	Early education	
	Elementary	

	Secondary /high school	
	College	
	Vocational school	
	University	
	Work-based education	
	Personal (one-to-one) tutoring	
	Other (please specify)	OPEN QUESTION
2_4	**If you're a teacher or trainer, in which subject area(s) do you usually teach? (Select all that apply)**	Multiple choice (multiple answers)
	Computing and Information Science	
	Psychology and Philosophy	
	Religious Studies	
	Social Science	
	Languages & Linguistics	
	Science	
	Mathematics	
	Arts	
	Literature	
	History & Geography	
	Economics, Business & Management	
	Applied Science, Technology, Engineering	
	Medicine	
	Health & Social Care	
	Education Studies	
	Physical Education	
	Special Education	
	Other (please specify)	OPEN QUESTION
2_5	**If you're a teacher or trainer, how many years have you been teaching?**	Multiple choice (one answer)
	Under 1 year	
	1 to 3 years	
	4 to 6 years	
	7 to 10 years	
	Over 10 years	
2_6	**Which of the following activities have you done in the past year, if any? (Select all that apply)**	Multiple choice (multiple answers)

	Presented your work at research events (e.g. conferences)	
	Published a paper in an academic journal	
	Published books or study guides with a commercial publisher	

	3. YOUR ICT AND INTERNET USE	
3_1	**What is your primary means of accessing the internet?**	Multiple choice (one answer)
	Via an Internet-enabled mobile phone (smartphone)	
	Via a tablet computer or iPad	
	At home using a broadband connection	
	At home using a dial-up connection	
	Via a games console	
	At work	
	At an educational institution where you're a student	
	Via a community facility (e.g. a library)	
	Via a commercial facility (e.g. cyber café)	
	In another way (please specify)	OPEN QUESTION
3_2	**Which of the following activities have you done in the past year? (Select all that apply)**	Multiple choice (multiple answers)
	Used a microblogging platform (e.g. Twitter) to share information	
	Maintained a personal blog or wiki	
	Shared an image online (e.g. via Instagram or Flickr)	
	Uploaded and shared podcasts or other audio/video online (e.g. via YouTube)	
	Contributed to an Internet-based discussion forum	
	Participated in a videochat (e.g. Skype/Zoom)	
	Downloaded a podcast (e.g. iTunes) or video	
	Contributed to a social network (e.g. Facebook, Google+)	
	Published research or teaching presentations publicly online	
	Used a virtual learning environment (VLE) to teach (e.g. Moodle. Blackboard)	
3_3	**How would you rate your current skill level when performing the following tasks?**	Likert scale [none/basic/proficient/advanced]
	Using standard computer programs (word processor, email, etc.)	
	Using social media (Facebook, Twitter, etc.)	
	Creating digital media (video, blogs, etc.)	
	Teaching or supporting learners through technology	

	YOUR ONLINE LEARNING EXPERIENCE	

4_1	**Before studying TEL MOOC, approximately how many MOOCs had you participated in?**	Multiple choice (one answer)
	None	
	1 - 3	
	4 - 8	
	More than 8	
4_2	**Before studying TEL MOOC, approximately how many online courses other than MOOCs had you studied?**	Multiple choice (one answer)
	None	
	1 - 3	
	4 - 8	
	More than 8	

	YOUR STUDY OF TEL MOOC	
5_1	**What were your reasons for studying TEL MOOC? (Select all that apply)**	Multiple choice (multiple answer)
	Gaining a certificate	
	Connecting with like-minded people	
	Developing your professional practice	
	Enhancing your CV	
	Improving your future employment prospects	
	Leisure or enjoyment	
	Gaining confidence or self-esteem	
	Supplementing or replacing college or university education	
	Interest in the subject	
	Demonstrating professional development to an employer	
	Other (please specify)	OPEN QUESTION
5_2	**What was your primary reason for studying TEL MOOC?**	OPEN QUESTION
5_3	**Which weekly activities did you complete? (Please select all that apply.)**	Multiple choice (multiple answers)
	Less than one week	
	Week One activities, discussions, and quiz	
	Week Two activities, discussions, and quiz	
	Week Three activities, discussions, and quiz	

	Week Four activities, discussions, and quiz	
	Week Five activities, discussions, and quiz	
	A TEL Activity Plan	

	YOUR OPEN EDUCATIONAL PRACTICES	
6_1	***Before* studying TEL MOOC, what was your experience of the following activities related to open educational resources (OER)?**	Likert scale [none/some/extensive]
	Using OER for personal reasons	
	Using OER in connection with teaching others	
	Using OER for other work-related reasons	
	Using OER for professional development	
	Adapting OER to fit my needs	
	Creating OER for work-related purposes	
	Sharing OER on a Creative Commons license	
	Resharing an OER I adapted on a Creative Commons license	
	Adding a resource to an open content repository	
	Further comments	OPEN QUESTION
6_2	**If you had used OER in connection with teaching or training prior to studying TEL MOOC, please specify the reasons for your using OER. (Select all that apply)**	Multiple choice (multiple answers)
	To prepare for my teaching/training	
	To get new ideas and inspiration.	
	To supplement my existing lessons or coursework	
	As ‘assets’ (e.g. images or text extracts) within a classroom lesson	
	To give to learners as compulsory self-study materials	
	To give to learners as optional self-study materials	
	To provide e-learning materials to online learners.	
	To compare them with my own teaching/training materials in order to assess the quality of my materials	
	To broaden the range of my teaching methods	
	To broaden the range of resources available to my learners	
	To make my teaching more culturally responsive	
	To enhance my professional development	
	To stay up-to-date in a subject or topic area	
	To learn about a new topic	
	To engage my students more fully in a topic area	
	To interest hard-to-engage learners	
	Other (please specify).	OPEN QUESTION

	THE IMPACT OF TEL MOOC ON YOUR PRATICE	
7_1	**To what extent do you agree with the following statements? As a result of studying TEL MOOC...**	LIKERT SCALE MATRIX [Strongly agree/ Agree/ Neither agree nor disagree/ Disagree/ Strongly Disagree/ not applicable]
	I make more use of OER in my teaching	
	I have broadened my coverage of the curriculum	
	I use a broader range of teaching and learning methods	
	I use a wider range of technologies to support teaching and learning	
	I experiment more with new ways of teaching	
	I have improved my ICT skills	
	I make use of a wider range of multimedia	
	I make more use of culturally diverse resources	
	I have a more up-to-date knowledge of my subject area	
	I reflect more on the way that I teach	
	I more frequently compare my own teaching with that of others	
	I am better able to meet diverse learners' needs	
	I use/make more use of OER to develop my teaching	
	I am more likely to openly share resources I've created	
	I collaborate more with colleagues at the institution in which I work	
	I network more with peers outside the institution in which I work	
	I am more confident about using technology-enabled learning techniques	
	I am more confident about creating new courses/course materials	
	I have gained a new job	
	I have been promoted in my existing role	
	My TEL course design skills have improved	
	I draw more on theory when developing my teaching	
	I am more confident about using OER	
	I am more positive about using OER	
	I am more positive about the value of TEL	
	I have influenced managers/institution leaders in respect of the implementation of TEL	
	I have influenced managers/institution leaders in respect of the use of OER	
	Further comments	OPEN QUESTION

7_2	**If you have made more use of OER in your teaching since studying TEL MOOC, please specify why. (Select all that apply.)**	Multiple choice (multiple answers).
	To prepare for my teaching/training	
	To get new ideas and inspiration.	
	To supplement my existing lessons or coursework	
	As 'assets' (e.g. images or text extracts) within a classroom lesson	
	To give to learners as compulsory self-study materials	
	To give to learners as optional self-study materials	
	To provide e-learning materials to online learners.	
	To compare them with my own teaching/training materials in order to assess the quality of my materials	
	To broaden the range of my teaching methods	
	To broaden the range of resources available to my learners	
	To make my teaching more culturally responsive	
	To enhance my professional development	
	To stay up-to-date in a subject or topic area	
	To learn about a new topic	
	To engage my students more fully in a topic area	
	To interest hard-to-engage learners	
	Other (please specify).	
7_3	**Which of the following factors, if any, have influenced any changes in your practice since studying TEL MOOC? (Select all that apply)**	Multiple choice (multiple answers)
	A need to meet performance targets connected with my job	
	The availability of funding to support TEL innovation	
	Financial incentives for implementing TEL pedagogies	
	Institutional policies or strategies driving the implementation of TEL or of OER	
	Government policies supporting the implementation of TEL or of OER	
	A desire to gain promotion	
	Colleagues' support and/or willingness to collaborate in trying new teaching techniques	
	Support from peers online (e.g. via social networks and forums)	
	Networking with other TEL MOOC participants after the course had ended (e.g. for peer support/sharing ideas)	
	Further comments/other factors driving changes to your practice since studying TEL MOOC	OPEN QUESTION
7_4	**Further comments about the impact of TEL MOOC on your practice**	OPEN QUESTION

	YOUR PROFESSIONAL DEVELOPMENT	
8_1	**In which of the following ways, if any, have you developed your professional practice since completing your study of TEL MOOC? (Select all that apply)**	Multiple choice (multiple answers)
	Discussion with others via social networking or microblogging (e.g. via Facebook, Twitter, Google+, WhatsApp)	
	Discussion with others in online forums	
	Discussion with others in person	
	Studying one or more MOOCs	
	Studying one or more online courses	
	Studying one or more face-to-face courses	
	Independent study using the internet to source information	
	Use of OER	
	Other professional development method/further comments	OPEN QUESTION

	BARRIERS PREVENTING THE IMPACT OF TEL MOOC	
9_1	**Which, if any, of these factors has limited the impact of TEL MOOC on your practice? (Select all that apply)**	Multiple choice (multiple answers)
	Lack of time to experiment	
	Lack of funding to purchase new technology	
	Lack of support from teaching colleagues	
	Lack of support from managers	
	Lack of IT support	
	Lack of ICT equipment	
	Dated software	
	Dated hardware	
	Unavailability of specific websites/platforms in my country	
	Slow or unreliable internet connection	
	Infrastructure problems (e.g. power cuts)	
	Student disinterest in TEL techniques	
	Student lack of skill in using ICT	
	My own lack of skill	
	Not knowing how to evaluate my practice	
	Personal issues (e.g. caring responsibilities, illness)	
	Change of job role	
	Curriculum constraints limiting the potential for experimentation with new teaching methods	
	Institutional policies and priorities	

	Government policies and priorities	
	Other factor(s) inhibiting the impact of TEL MOOC on your practice	OPEN QUESTION
9_2	**Which, if any, of these factors has affected your use of OER since studying TEL MOOC? (Select all that apply)**	
	Knowing where to find OER	
	Difficulty in finding suitable OER in my subject area	
	Difficulty in finding suitably high quality OER	
	Difficulty in finding up-to-date OER	
	Difficulty in finding OER in a suitable language	
	Difficulty in finding resources relevant to my local context	
	Difficulty in finding resources appropriate to the sector/level in which I teach	
	Technology problems when downloading resources	
	Not being skilled enough to edit resources to suit my own needs/context	
	Work colleagues/managers not being positive about the use of open educational resources	
	Not knowing whether I have permission to use, change or modify resources	
	Not having enough time to look for suitable resources	
	Not having connections with OER-using peers who could be a source of support	
	Not knowing how to use OER in the classroom	
	Not having enough time/opportunities to experiment with using OER in the classroom	
	Lacking institutional support for my use of OER	
	Resources not being aligned with professional standards or regulation	
	Other (please specify)	OPEN QUESTION
9_3	**What strategies have you used, if any, to overcome any of these challenges/barriers?**	OPEN QUESTION

	IMPACT ON OTHERS OF YOUR TEL MOOC STUDY	
10_1	**To what extent do you agree with the following statements? My study of TEL MOOC has led to...**	Likert Scale matrix: [Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]
	My sharing information about TEL pedagogies with colleagues	
	My sharing information about OER with colleagues	
	My colleagues making more use of OER in their teaching	
	My colleagues using a broader range of teaching and learning methods	

	My colleagues using a wider range of multimedia resources	
	My colleagues making more use of culturally diverse resources	
	My colleagues reflecting more on the way they teach	
	My colleagues more frequently comparing their teaching with that of others	
	My colleagues using a wider range of technologies for teaching and learning	
	My colleagues being more confident about using technology-enabled learning techniques	
	My colleagues being more likely to openly share resources they've created.	
	My colleagues being more confident about creating new courses/learning materials.	
	Changes in the attitudes of managers in my workplace	
	Changes in colleagues' attitudes towards the implementation of/innovation in TEL	
	Policy changes in the institution/organisation in which I work	
	Cost-savings in the institution in which I work	
	My sharing the openly licensed TEL MOOC materials with colleagues	
	Additional examples of impact on people other than your own learners	OPEN QUESTION
	Further comments (please give specific examples)	OPEN QUESTION
10_2	**If you're a teacher or trainer, to what extent do you agree with the following statements?**	
	My study of TEL MOOC has led to...	Likert Scale matrix: [Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]
	My learners' increased participation in class discussions	
	My learners' increased interest in the subjects taught	
	My learners' increased satisfaction with the learning experience	
	My learners' grades improving	
	My learners' increased confidence	
	My learners' increased independence and self-reliance	
	My being better able to accommodate diverse learners' needs	
	My learners' increased engagement with lesson content	
	My learners' increased experimentation with new ways of learning	
	My learners' increased collaboration and/or peer-support	
	My learners’ increased enthusiasm for future study	
	My learners being more likely to complete their studies	
	My learners being more likely to attend school/college	

	My learers sharing resources with others more often	
	My learners being more likely to use/create/share OER	
	Further comments and specific examples	OPEN QUESTION
11_1	Would you like to be interviewed by the researcher on your experience of TEL MOOC?	Yes/No
11_2	If you are willing to be interviewed, please give your email address	OPEN QUESTION

11.2 Appendix 2: Consent letter sent with survey invitation

Dear,

We are contacting you, as you have completed the Massive Open Online Course (MOOC) on Introduction to Technology-Enabled Learning offered by the Commonwealth of Learning (COL) and Athabasca University (AU). In order to understand the impact of the TEL MOOC and learn from your experiences, we are conducting a survey of the successful participants.

Your participation in this research study will involve completing a survey, which will take between 10 and 15 minutes to complete. Some participants may also be contacted for a more detailed interview. The interview would take between 15 and 20 minutes in total.

Your involvement in the study is voluntary and you may choose not to participate or to stop at any time, without penalty or loss of benefits to which you are otherwise entitled. If you decide to stop or withdraw from the study, the information collected from you up to the point of your withdrawal will be kept as part of the study and may continue to be analysed.

In either case, all information collected in this study will remain confidential. No individually-identifiable information about you, or provided by you during the research, will be shared outside the research team without your written permission. Identifying information of participants will be removed from any reports that are seen by anyone other than the research team. The results of the research study may be published, but your name or any identifying information will not be used.

There are no known risks associated with this research. The research is being conducted by Dr. Leigh-Anne Perryman from the Open University, UK and if you have any questions about this research project please feel free to contact via email at leigh.a.perryman@open.ac.uk.

Completing the survey indicates your consent to participate in the research project described above. If you choose to consent to a follow-up interview we will ask you to provide an email address so we may use it to contact you. Your email address will not be used for any other purpose or shared with anyone outside the research team.

You can access the survey using the following link: Link here

Please complete the Survey by July 15, 2019.

Yours sincerely,

TEL Initiative at COL

11.3 Appendix 3: Consent email sent with interview invitation

Dear,

I am contacting you, as you have completed the TEL MOOC impact evaluation survey and have consented to be contacted in respect of being interviewed in connection with the TEL MOOC evaluation research study. In order to explore in greater depth your survey responses, and the impact of TEL MOOC on your attitudes and practice, I would like to invite you to be interviewed via Skype or WhatsApp.

The interview would take between 15 and 20 minutes. Your involvement is entirely voluntary and you may choose not to be interviewed, or to stop the interview at any time, without penalty or loss of benefits to which you are otherwise entitled. If you decide to stop or withdraw from the interview, the information collected from you up to the point of your withdrawal will be kept as part of the study and may continue to be analysed.

In either case, all information collected in this study will remain confidential. No individually-identifiable information about you, or provided by you during the research, will be shared outside the research team without your written permission. Identifying information of participants will be removed from any reports that are seen by anyone other than the research team. The results of the research study may be published, but your name or any identifying information will not be used unless you give written permission that you wish to be named.

There are no known risks associated with this research. If you have any questions about the interview, or about the TEL MOOC evaluation study more generally, please feel free to contact me via email at leigh.a.perryman@open.ac.uk.

Agreeing to be interviewed indicates your consent to participate in the research project described above.

I look forward to hearing from you and would greatly value your participation.

Yours sincerely,

Dr Leigh-Anne Perryman

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